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On the Lestremiinae (Diptera: Cecidomyiidae) of Japan Part 2: Tribe Peromyiini Kleesattel, 1979

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Abstract. Two genera with altogether 72 species of the tribe Peromyiini that occur in Japan are treated here. For each of these taxa information is provided on adult morphology, biology and distribution within Japan and its taxonomy is discussed. For the genus *Peromyia*, issues of species diversity and systematics, evaluation and evolution of morphological characters, zoogeography, and biology are discussed in the context of all Japanese species included. The following taxa are described as new to science: *Gagnea tsutaensis* gen. et sp. n., *Peromyia acutula* sp. n., *P. aleemkhani* sp. n., *P. ampla* sp. n., *P. angulata* sp. n., *P. anocellata* sp. n., *P. austrina* sp. n., *P. autumnalis* sp. n., *P. avia* sp. n., *P. ayaensis* sp. n., *P. bipuncta* sp. n., *P. boreojaponica* sp. n., *P. boreophila* sp. n., *P. capitata* sp. n., *P. carinata* sp. n., *P. cassa* sp. n., *P. centrosa* sp. n., *P. fujiensis* sp. n., *P. gemella* sp. n., *P. gotohi* sp. n., *P. ibarakiensis* sp. n., *P. imperatoria* sp. n., *P. lobuscorum* sp. n., *P. maetoi* sp. n., *P. miyazakiensis* sp. n., *P. montivaga* sp. n., *P. obesa* sp. n., *P. ogawaensis* sp. n., *P. ornata* sp. n., *P. okochii* sp. n., *P. pilosa* sp. n., *P. pumila* sp. n., *P. puncta* sp. n., *P. rhombica* sp. n., *P. ryukyuensis* sp. n., *P. semota* sp. n., *P. simpla* sp. n., *P. sphenoides* sp. n., *P. spinosa* sp. n., *P. subcurta* sp. n., *P. tenella* sp. n., *P. trifida* sp. n., *P. tripuncta* sp. n., *P. tsukubasanensis* sp. n., *P. valens* sp. n., *P. vernalis* sp. n., and *P. yezoensis* sp. n.

Key words: systematics, Diptera, Cecidomyiidae, Lestremiinae, Peromyiini, Japan, new genus, new species.

Introduction

The tribe Peromyiini comprises two genera of micromyid Lestremiinae, *Peromyia* and *Gagnea*, with the latter here described as new to science. The adults of peromyiine species are extremely small-sized and morphologically uniform; the smallest lestremiine gall midges, hardly more than half a millimetre in body size, belong here. Small size and uniformity cause enormous difficulties in taxonomic studies on Peromyiini. Its species can be identified by studying adult males. External genitalic structures in males provide the most appropriate species-specific characters, but their absolute taxonomic significance is limited by artefacts that complicate character evaluation and intraspecific variability occurs to an extent that is discussed controversially. Further, one has to suspect that *Peromyia* species might be overlooked because slight morphological differences between species, often involving membranous rather than sclerotized structures, do not become clearly apparent by using light microscopy alone.

Species of the Peromyiini are found within a wide range of terrestrial habitats but most abundant in broad-leaved forests. The bulk of their (exclusively?) mycetophagous larvae lives in decaying plant matter, preferably by using the structural richness of dead wood. The group is apparently cosmopolitan in distribution, with by far most of its species known from the Holarctic, in particular its Palearctic Subregion. But even there one may expect many species that are still unknown to man, with their number certainly by far

exceeding that of the described species. Results from my study on Japanese Peromyiini clearly substantiate this expectation.

Previous information available in literature on Holarctic Peromyiini was reviewed and discussed by Jaschhof (1998) except for an article by Berest (1995) on issues of ecology and zoogeography of Palearctic *Peromyia*, and several papers published subsequently (cf. Mamaev 1998a, c, Mamaev & Zaitzev 1997a, 1999).

In this paper, adults of the Japanese species of the Peromyiini known so far are treated in depth, except for the species complex of *Peromyia palustris* which I will deal with in a separate article. The structure of this paper follows the same pattern as applied in part 1 of my contributions on Japanese Lestremiinae (Jaschhof 2000). For details of material, methods, and abbreviations used here, it will be necessary to consult the paper cited.

Genus *Gagnea* gen. n.

Type-species. *Gagnea tsutaensis* sp. n. (see description below). Monotypic.

Diagnosis. This new genus is characterized by its extremely long antennae that have up to 28 flagellomeres in males and more than 14 in females. No other male lestremiine is known which has antennae longer than *Gagnea* males. In *Peromyia*, 12-13 flagellomeres are present in males and eight to ten in females. Males in the single known species of *Gagnea* have their flagellomeres with some of the sensory hairs furcate, which is in contrast to *Peromyia* males having sensory hairs always non-furcate. Both characters, long antennae with more than 13 flagellomeres in males and more than ten in females and furcate sensillae in males, I consider autapomorphic in *Gagnea*.

Discussion. As for all those characters not mentioned in the generic diagnosis, *Gagnea* fits completely the Peromyiini (cf. Jaschhof 1998: 428 ff.). Male genitalia in *Gagnea tsutaensis* are remarkable for the dark, bar-like structure which is present between tegmen and ventral plate, which might represent its poorly sclerotized genital rod. If so, this would be unique within the Peromyiini.

Adult morphology in *Gagnea tsutaensis* gives no indication of the closer relationship to certain species, or species-groups in *Peromyia*. I consider *Gagnea* the sister-group of *Peromyia*. Autapomorphic characters diagnosing the genus *Peromyia* in the former sense (cf. Jaschhof l. c.: 428 f.), now apply to the tribe Peromyiini as a whole. Genus *Gagnea* is founded for the reasons explained above, while there are no formal arguments for the monophyly of *Peromyia*. If one accepts that a sclerotized genital rod is present in *Gagnea*, its reduction has to be considered the derived state and a synapomorphy in *Peromyia* species.

Etymology. This new genus is named to honour Dr Raymond J. Gagné, research entomologist em., U.S. Department of Agriculture, Systematic Entomology Laboratory, Washington, D.C., for his authoritative contributions to cecidomyiid science and his efforts in encouraging and teaching the younger generation of cecidologists.

Gagnea tsutaensis sp. n. (Figs. 1A-E)

Male. Body size: 1.0-1.1 mm.

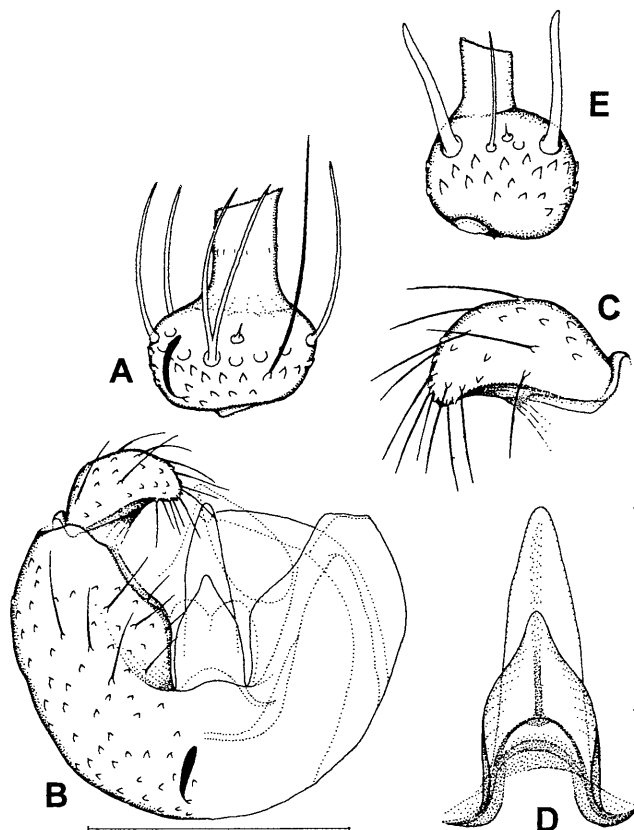
Head: Postfrons non-setose. Eye bridge 2-3 facets long laterally and 3 facets at vertex. With 2 rows of postocular bristles. Antennae with 28 flagellomeres (only one specimen available having one flagellum complete); terminal flagellomere ovoid. Flagellomere 4 (Fig. 1A) with neck approximately as long as node; node wider than long, with single to double whorl of short setae basally that is incomplete on dorsal side sometimes, next to it with single to triple whorl of long setae, medially, i. e. just beyond the setae, with whorl of long sensory hairs with 1 or a few of them furcated, distally with a few sensory

spines. Palpi 3-segmented, terminal segment pointed and longest, all segments with sensory hairs, the latter sparse on segment 3.

Thorax: Scutum with extensive lateral and dorsocentral rows of setae and scales. Empodia just as long as claws. Claws of midlegs with 2-3 minute teeth. Wings: R1 = 3 rs, strong anterior portion of C extending point of intersection with R5 for (1-)2 times the vein width of R5, CuA-fork long, CuA2 almost reaching wing margin.

Abdomen/pattern of tergal plaques: 0/2/2/2/0/0/0/0.

Genitalia: Gonocoxites (Fig. 1B) heavy, densely covered with setae and scales ventrally except membranous central portion, distal margin with deep emargination extending beyond midlength of gonocoxites, with dorsal transverse bridge heavy. Gonostyli (Figs. 1B, C) small, slightly curved inwards, excavated inside, tapered to tip, evenly covered with long setae. Tegmen (Fig. 1D) elongate, in distal half narrow and completely membranous, with distinct ventral plate tapered to tip and covering more than proximal half of tegmen, in between tegmen and ventral plate with dark, narrow longitudinal band having sharp contours sometimes (genital rod?). Tergite 9 short, forming a sclerotized semicircle with medial interruption of sclerotization and interrupted



Figs. 1A-E: *Gagnea tsutaensis* sp. n.; A: male flagellomere 4, lateral view (0.05 mm); B: male genitalia, ventral view (0.1 mm); C: gonostylus, ventral view (0.05 mm); D: tegmen, ventral view (0.05 mm); E: female flagellomere 4, ventrolateral view (0.05 mm). A-D: holotype, E: paratype. (In parentheses: length of scale bar.)

row of setae along distal margin. Tergite 10 large, bilobed, extending beyond distal margin of tergite 9, densely pubescent and with fine setae. Sternite 10 slightly bilobed (obviously largely fused except its distal portions), densely pubescent.

Female. Body size: 1.8 mm.

Head: Antennae with more than 14 flagellomeres (antennae broken in the one specimen available). Flagellomere 4 (Fig. 1E) with neck shorter than node; node wider than long, with single to double whorl of short scales basally that is incomplete on dorsal side, next to it with double to triple whorl of long setae, distally with 4 very strong and long sensory hairs, a few shorter sensory hairs and sensory spines.

Genitalia: Spermathecae 2, fairly small, disc-shaped, weakly sclerotized.

Types. Holotype: male, no. A1075, Japan, Honshu, Aomori Pref., Tsuta hot spring, in mature, mixed deciduous forest dominated by beech (*Fagus crenata*), 500-600 m, 25 June-28 July 1999, by Malaise trap, leg. Jaschhof [in KUEC]. Paratypes: 4 males, 1 female, no. A1076-A1080, same data as holotype [no. A1079 in KUEC, the others in ZIMG].

Discussion. *Gagnea tsutaensis* is readily distinguished from *Peromyia* species by its long antennae having far more than 12 male or nine female flagellomeres that represent the normal number in *Peromyia*. In both sexes, flagellomeres have their nodes strikingly wider than long and their necks very short.

Distribution and biology. Hk (Ir), Hn (Ao).

Specimens of *tsutaensis* were captured in northern Japanese deciduous forests, within and north of the beech zone, up to 600 m a. s. l. Flight period: Hk: VIII; Hn: VII.

Etymology. The name is derived from the type locality, Tsuta, representing a fine example of mature, cool temperate broad-leaved forest which was shown to contain an extremely rich lestremiine fauna.

Other material studied (1 male). Hk: Ir, Sapporo City, Toyohira, 26 July-16 Aug. 1999, leg. Fukuyama & Jaschhof, 1 male, no. A1081.

Genus *Peromyia* Kieffer, 1894

Some 69 species of *Peromyia* have been previously described from the Holarctic Region (cf. list in Jaschhof 1998: 431 ff., and also Mamaev & Zaitzev 1997a, Mamaev 1998a, c). As for Japan, 11 species have been known so far (Yukawa 1971, Jaschhof 1998). With respect to the faunas adjacent to Japan, several *Peromyia* species were reported or described from Far Eastern Russia (Berest 1994, Mamaev 1994, 1998a, Mamaev & Zaitzev 1997b, Jaschhof 1998). A key to *Peromyia* in the Russian Far East and adjacent regions including Japan which was recently published by Mamaev & Zaitzev (1999) considers 17 species. At least 15 species are known to occur in China (Bu in litt., ined.). More far away, in Peninsular Malaysia *Peromyia* has been proven to be common and rich in species (Jaschhof ined.).

For this study, 71 Japanese species of *Peromyia* were identified, with 46 of them being new to science. One more species, *P. albicornis* (Meig.), previously reported as belonging to the Japanese fauna I could not confirm by additional findings, but it increases the total number to 72. As a result, the genus *Peromyia* comprises currently 113 species in the Holarctic that are partly distributed in the Oriental and Oceanic Regions, too. Specimens in the Yukawa and Jaschhof collections, too poor in condition or too few in number to be identified with confidence, indicate the presence of at least 20 more species in Japan.

In this paper, I continue to subdivide this genus into species groups rather than into subgenera, because I cannot explain all the established groups by arguments based on truly autapomorphic characters and not all species can be grouped with certainty. When the Holarctic species of *Peromyia* were recently revised (cf. Jaschhof 1998) several

technical mistakes were made which were drawn to my attention through the kindness of Dr Raymond J. Gagné, Washington, D.C. I take the opportunity for correction here in the respective species sections (see *Peromyia fungicola*, *intermedia*, and *muscorum*). Further, it should be noted that the paper on *Peromyia* in North America, cited in Jaschhof (l. c.) as "Jaschhof & Mohrig 1998, in print", has been withdrawn and so was not published.

There are several previously described *Peromyia* species that I cannot identify on the basis of their original descriptions or keys published subsequently. These sources are too superficial and incomplete, lack appropriate illustrations and disregard similar species. The study of type material appears to be the only way in order to clarify the identity of those species, but their types are not available for lending. Consequently, when working on Japanese *Peromyia* I had to ignore the following species unidentifiable to me (listed by year of publication): *Peromyia aberrans* Mamaev, 1963; *P. almensis* Berest, 1989; *P. scutellata* Mamaev, 1990; *P. directa* Mamaev et Berest, 1990; *P. sphaerica* Berest, 1991; *P. paliformia* Berest, 1994; *P. anisotoma* Mamaev, 1994; *P. concitata* Mamaev et Berest, 1994; *P. sacculiformia* Mamaev et Berest, 1994; *P. palposa* Mamaev et Zaitzev, 1997; *P. baccha* Mamaev, 1998; *P. decurvata* Mamaev, 1998; *P. mediterranea* Mamaev, 1998; *P. miniuscula* Mamaev, 1998; *P. peninsulae* Mamaev, 1998 (as *penisulae*, error); and *P. trifurcata* Mamaev, 1998.

Supplement to the Information on the Genus and Discussion

Adult morphology

Male. Head: Eye bridge occasionally up to 5-6 facets wide. Ocelli exceptionally absent (in *anocellata*). Antennal flagellomeres having their sensory hairs sometimes with basal appendices (termed appendiculate sensory hairs, see *curta*-group).

Thorax: In one species (*tsukubasanensis*) with elongate, flat overall shape resulting from the katepisternum being rounded ventrally (not triangular and thus shortened) and the postphragma being unusually long.

Abdomen/pattern of tergal plaques: Usually 0/2/2/2/2/1/1/0/0, or 0/2/2/2/2/1/0/0, but differing patterns occur as well, for example 0/1/1/1/1/1/0/0. These patterns are largely stable intraspecifically, variation within species was found mainly in the posterior segments which are poorly sclerotized, making the recognition of distinct plaques difficult.

Species Diversity and Systematics

There is certainly no other Palearctic territory of approximately the same size and similar richness in natural conditions to Japan which is so intensively studied for its *Peromyia* fauna. This makes convincing comparisons between regions difficult, but there is no doubt that the diversity of *Peromyia* species in Japan is extremely high compared with that in many other parts of the Palearctic. All of the Palearctic, Japan excluded, has 69 *Peromyia* species described but Japan's fauna alone has currently 72. Germany, with its landmass of comparable size, has half the number of Japanese species. A single mature, cool temperate broad-leaved forest in central Honshu, only 100 ha in size, was found to contain at least 26 *Peromyia* species, captured within only six weeks in spring 1999. In comparison, half that number of species was recorded from a comparable forest in northern Germany over several years. The outstanding diversity in Japanese *Peromyia* is also reflected if one takes a closer look at the species number in certain innergeneric species groups.

The intrageneric classification used in this paper is almost identical to that proposed by Jaschhof (1998: 431ff.). All but one of the species groups of Holarctic *Peromyia* have representatives in Japan too; the central European *penicillata*-group which is absent in Japan is rather doubtful in its distinctness. Seen systematically, it is a striking feature of

the species composition of Japanese *Peromyia* that most of its species groups comprise significantly more taxa compared with other regions. For example, the widespread *caricis*-group has ten species in Japan but six representatives in the remainder of the Palearctic, the *modesta*-group has 13 in Japan and seven outside. Another subunit, the *ornata*-group with four closely related species, is exclusively Japanese and represents a true morphological novelty in *Peromyia*.

The fact that the majority of Japanese *Peromyia* species could be classified into existing groups might be seen, on the one hand, as a confirmation of this intrageneric classification. On the other hand, that fact underlines once more that *Peromyia* adults, seen as an entity, are morphologically largely homogenous. As a consequence, systematic and phylogenetic considerations continue to depend widely on structural differences in male genitalia, the only part of the body that provides a relative diversity in morphological structures and thus taxonomic characters. Therefore, which appears to confirm the proposed species groups might be not more than the result of too few and simple arguments, or characters. As another consequence, even the wealth of 46 new species described from Japan cannot add much to an improvement in understanding the relationship between certain groups of *Peromyia*, or between the *Peromyiini* and its hypothesized sister group, *Bryomyiini* + (*Micromyiini* + *Aprioniini*) (cf. Jaschhof 1998). Indications for relationship are discussed in the introduction paragraphs for certain species groups (see below).

Evaluation of Characters and Character Evolution

Only two of the 12 groups that Japanese *Peromyia* species are classified into are diagnosed by characters other than male genitalic. In the *curta*-group, characterized by its peculiar antennal sensillae, species correspond in the basic structure of the male genitalia. The opposite is true for species of the *aurantiaca*-group which share the presence of membranous dots on their mesonotum, a character considered synapomorphic, but some of which differ largely in respect of their male genitalia. For example, it might be hard to explain by arguing about genitalic characters why *Peromyia bipuncta* and *puncta* (see below) should share a common ancestor. Supposing that the *aurantiaca*-group is indeed monophyletic, this case indicates that genitalic characters, necessarily favoured because of the lack of alternatives, may fail in providing a convincing basis for phylogenetic considerations in *Peromyia*. The situation is worsened in that some of those characters employed are anything but complex since the respective structures are simple as well (see, for example, the overall shape of gonostyli). One has certainly to expect homoplasies to a greater extent. Structures that might provide more complex characters are hard to study, as for example the tegmen in its three-dimensional construction. Apart from its minute size, those structures are membranous rather than sclerotized, lying inside rather than on the surface.

On an alphataxonomic level the difficulties in diagnosing and identifying *Peromyia* species have sharpened with the increasing number of taxa described from Japan. This is trivial but worth noting in so far as morphological variation within species, or populations of Japanese *Peromyia* tends to be stronger than on the continent. In several cases this applies to characters which were thought to be of absolutely diagnostic value, for example the vestiture on antennal flagellomeres, or the arrangement of postocular bristles. This variation will be demonstrated in the species sections that follow, but not to its full extent. I must confess that in some groups of *Peromyia*, such as the *caricis* - or *intermedia*-groups, I partly failed in diagnosing clearly distinguished species and left a considerable amount of specimens unidentified. I suspect that those complex taxonomic problems cannot be solved satisfactorily by the methodology that is usually applied in taxonomic research on free-developing gall midges including this study.

In some of the species that are distributed in Europe as well as in Japan one can find slight morphological differences depending on the geographical origin of the specimens.

As for those allopatric populations, it is not more than an issue of convention born from experience whether one considers them conspecific or not. And comparisons are made more difficult by the fact that specimens are available for study from only a few geographically isolated localities but not from the (suspected) complete range of such species.

Zoogeography

As for the zoogeographic regions, 72 species of *Peromyia* have their ranges within Japan as follows: 71 species are Palearctic, 20 are Oriental, and three are Oceanic. From this it appears that several species extend their area to more than one region: three species are Palearctic / Oriental / Oceanic, 19 are Palearctic / Oriental, 52 are exclusively Palearctic, and one is exclusively Oriental. Seen formally, *Peromyia* species which have been found to date only in Japan might be considered endemics. I suspect that future surveys, particularly in continental parts of the Manchurian Province, will disprove this status for many of them, but at present that portion of Japanese species, still 47, is irrelevant to more detailed distributional considerations except within Japan.

The rough zoogeographic classification given above does not adequately reflect that wide species areas in *Peromyia* appear to be the typical pattern. As for their ranges within Japan, 27 species are known from only one of the large islands, or island groups (i. e., Hokkaido, Honshu, Shikoku, Kyushu, Ryukyu Islands, and Bonin Islands). When "rare" species, i. e. those having been found at one single locality, are excluded from the above number, ten species with a single island distribution remain. Their share is clearly overwhelmed by the number of *Peromyia* species distributed on two islands (25 species), or three and more islands (20). More extensive faunistic surveys should result in a further shift in these proportions.

Looking for patterns in species distribution which appear to be more restricted, a group of species that is apparently boreal, or boreal-mountainous in distribution is much better outlined than an exclusively southern Japanese (warm-temperate) component. Thirteen or so species might be referred to the former pattern, with Ibaraki Prefecture (in central Honshu) or even Hyogo Prefecture (in western Honshu) containing its southernmost outposts. These species are: *Peromyia anatina*, *bidentata*, *boreojaponica*, *boreophila*, *lobuscorum*, *maetoi*, *modesta*, *montivaga*, *okochii*, *semota*, *tundrae*, *valens*, and *yezoensis* (for details, see species chapters below). In contrast, only the distributional data for *Peromyia centrosa* indicate an exclusively southern Japanese area (rare species and those with a single island distribution, see above, not taken into consideration).

When the Japanese fauna of *Peromyia* is seen in a wider view, one has to consider first the 25 species (roughly one third of Japan's total) which have been known also from other parts of the Palearctic, or Holarctic. Among them, there are at least four truly Holarctic species (*Peromyia fungicola*, *modesta*, *neomexicana*, and *photophila*). Among them, *Peromyia neomexicana* is rarely found elsewhere within its apparently wide total area (cf. Jaschhof 1998: 442), but in Japan it is remarkably common and widespread. Several *Peromyia* species that have been previously known to be distributed in the European Province are here recorded for Japan, or all of the eastern Palearctic, for the first time. In these species, present data suggest a disjunct area with a European centre of distribution on the one hand and a Far Eastern centre on the other, but whether this pattern is real or due to the lack of information from large parts of Siberia cannot be decided yet. There are several species belonging to the latter group which even in Europe must be considered extremely rare, such as *Peromyia bidentata*, *gryphiswaldensis*, and *tundrae*. As mentioned above, the *Peromyia ornata*-group (see below) is the only distinct species group in Japanese *Peromyia* which appears to be absent from the remainder of the Palearctic. Since in Japan peromyiid genera other than *Peromyia* were proven to contain a component of supposed Indo-Malayan origin (cf. Jaschhof 2000, Jaschhof ined.), one may speculate whether this applies to the *Peromyia ornata*-group as well.

Biology

One fourth of all species of the Lestremiinae found in Japan belong to the Peromyiini. This makes *Peromyia* species a considerable component of the lestremiine fauna in Japanese woodlands. Even when I have not done quantitative studies, field observations indicate that at least some species may sometimes occur in tremendous numbers of adult specimens. Such a mass occurrence was observed in *Peromyia muscorum* (and species of the *palustris*-complex not considered in this paper) and, to a lesser extent, in *aleemkhani*, *boreophila*, *cornuta*, *photophila*, *pumila*, and *rhombica* (see below). For example, in forests on the Bonin Islands where only four *Peromyia* species were found, these species (except for *carinata*, see below) tend to mass development which possibly results from a lack of competition by congeners.

Data presented here confirm the previous opinion that the flight period of *Peromyia* adults has phenologically two peaks per year, one in spring / early summer and the other in autumn. This does not necessarily mean that within a single species only one or two generations per year occur. Further, in widespread species the flight periods of local populations overlap. As a result, adults of those species may be found continuously within Japan from spring to autumn, depending on altitude and latitude of the various localities. Conditions in Hokkaido allow for only one peak per year that is in summer, of course. Nevertheless, *Peromyia* adults may occur throughout the year, with wintery flight activity in certain species as far north as central Honshu.

Forests contain undoubtedly the majority of *Peromyia* species and most species are certainly pure forest inhabitants. (As for Japan, though, grasslands or other open habitats have not been studied yet for their Lestremiinae.) Resulting from my studies, it is hard in general to make out a preference of certain species for certain forest types. On the one hand, this is clearly a result of the too general approach which was not focussed on certain species, or particular ecological factors within the multi-dimensional forest habitat. On the other hand, *Peromyia* species appeared once more to be of considerable ecological plasticity. As shown above, most species inhabit a wide area stretching over many parallels of latitude and this alone means, for example, living in cool temperate as well as warm temperate broad-leaved forests. As mentioned above, a group of species was recognized that is obviously boreal, or boreal / mountainous in distribution. In other words, this group appears to inhabit exclusively subalpine evergreen coniferous and cool-temperate broad-leaved forests, but this I argue is not necessarily a pattern caused by factors operating in a certain forest structure. Even coniferous plantations may be inhabited by the same species as found in broad-leaved forests (for details, see species sections below), while it remains unclear whether they make use preferentially of remainders of broad-leaved trees that often structurally "upvalue" those monocultures. This is most evident in plantations of sugi (*Cryptomeria japonica*) which sometimes contain large quantities of oak logs brought in as the substrate for cultivated mushrooms. I collected lestremiines at various sites of such former cultures, with the oak logs remaining and decaying undisturbed over several years, and found some 26 lestremiine species with ten *Peromyia* species among them. In contrast, there are no indications that any *Peromyia* species prefers or inhabits exclusively coniferous forests, either natural or artificial.

Broad-leaved forests were proven to be most rich in *Peromyia* species when their canopy was close enough to avoid rapid drying up of the ground layer and when these forests contained rich accumulations of rotting plant matter, preferably decaying logs. These conditions are usually provided best in mature, natural stands which in Japan are typically associations of many different tree species. Three Japanese forests of this structure, 100 ha or less in size, were shown to contain between 20 and 26 *Peromyia* species, although the efforts in taking the species inventory were limited to a few weeks per year. Another example may demonstrate that the availability of decaying wood, as the suspected substrate for larval development, is of fundamental importance for maintaining

richness in *Peromyia* species. During two weeks of August 1996, 20 species of *Peromyia* were Malaise trapped in a secondary, only six years old deciduous forest (Ogawa Forest, Ibaraki Prefecture). As concluded from a more detailed description of that site, the stumps and roots of trees which formerly grew there had not been removed from the ground after cutting and could now provide a rich substrate for fungal growth and lestremiine development.

Even when not studied systematically, isolated, or park-like woodland contains lestremiines including *Peromyia*, a fact that does not surprise given the good dispersal ability suspected for these species. In this context, one may consider whether *Peromyia* species follow an opportunistic strategy, since the availability of their larval environment, decaying plant matter in a stage that maintains fungal growth, is rather unpredictable. Such a view could help to explain why certain species occur so sporadically, or show a remarkably patchy distribution within their wide total range.

Key to the Males of the Japanese Species of *Peromyia*

Since not all species considered in the following key are illustrated in this paper, I recommend for those species to consult the figures given by Jaschhof (1998).

- 1 Mesonotum with 1 to 4 bright, membranous dots 2
- Mesonotum without bright, membranous dots 7
- 2 Gonostyli strongly tapering to tip, with apical tooth or 2 very strong spines 3
- Gonostyli not or slightly tapering to tip, without tooth or 2 very strong spines 4
- 3 Gonostyli with apical tooth; mesonotum with 2 bright dots *P. bipuncta* sp. n. (Fig. 2)
- Gonostyli with 2 very strong apical spines; mesonotum with 1 bright dot *P. bidentata* Ber.
- 4 Nodes of antennal flagellomeres with 1 distal and 1 medial whorl of sensory hairs . 5
- Nodes of antennal flagellomeres with 1 distal whorl of sensory hairs and additional sensory hairs among the setae in the proximal half of node 6
- 5 Tegmen heavy, with short, sclerotized ventral plate formed like a horseshoe; gonostyli with almost spine-like hairs apically *P. imperatoria* sp. n. (Fig. 3)
- Tegmen smaller, with weak ventral plate approximately as long as wide; gonostyli with brush of long, dense hairs apically *P. neomexicana* (Felt)
- 6 Gonostyli heavy, broader distally than proximally; mesonotum with 3 bright dots *P. tripuncta* sp. n. (Fig. 5)
- Gonostyli elongate, slightly tapering to tip; mesonotum with 1 bright dot *P. puncta* sp. n. (Fig. 4)
- 7 Antennal flagellomeres with appendiculate sensory hairs (cf., for example, Fig. 21A) 8
- Antennal flagellomeres with simple sensory hairs (cf., for example, Fig. 2A) 13
- 8 Gonostyli strikingly long and slender; appendices of sensory hairs very long *P. tenella* sp. n. (Fig. 25)
- Gonostyli not strikingly long and slender; appendices of sensory hairs short and thus often hard to see 9
- 9 Tegmen very narrow and pointed apically *P. acutula* sp. n. (Fig. 20)
- Tegmen slender but never pointed apically 10
- 10 Tegmen with distinct ventral plate; gonostyli with brush of long, dense hairs in distal third *P. gemella* sp. n. (Fig. 22)
- Tegmen with its ventral plate absent or indistinct, i. e. visible only by its distal margin; gonostyli without hair brush 11
- 11 Tegmen without ventral plate *P. simpla* sp. n. (Fig. 23)

- Tegmen with ventral plate visible by its distal margin 12
- 12 Gonostyli stout, slightly flattened and excavated inside, broadly rounded apically
..... *P. curta* Jasch. (Fig. 21)
- Gonostyli elongate, neither flattened nor excavated inside, tapering to tip
..... *P. subcurta* sp. n. (Fig. 24)
- 13 Gonostyli with lobe inside that is conspicuous and nose-like (Figs. 26A, 33B) or
inconspicuously wart-like (Fig. 28C) or keel-like (Figs. 27C, G) 14
- Gonostyli without inner lobe 21
- 14 Nodes of antennal flagellomeres with 1 distal whorl of fine, long sensory hairs that
easily break 15
- Nodes of antennal flagellomeres with 1 medial whorl of sensory hairs and numerous
sensory hairs distally with some of them forming an indistinct distal whorl, all
sensory hairs strong 19
- 15 Gonostylar lobe inconspicuous, keel-like, inserted along full length of inner side of
gonostylus *P. carinata* sp. n. (Fig. 27)
- Gonostylar lobe different 16
- 16 Gonostylar lobe small, wart-like, inserted in centre of inner side of gonostylus
..... *P. centrosa* sp. n. (Fig. 28)
- Gonostylar lobe different 17
- 17 Gonostylar lobe long, inserted at midlength of inner side of gonostylus; tegmen
including ventral plate with indistinct contours *P. anatina* Mam. et Ber. (Fig. 26)
- Gonostylar lobe shorter, inserted along full length of inner side of gonostylus; tegmen
or at least its ventral plate with distinct contours 18
- 18 Tegmen with distinct side margins, its ventral plate indistinct; gonostylar lobe usually
clearly set off from the main body of gonostylus *P. intermedia* (Kief.) (Fig. 29)
- Tegmen with indistinct side margins, its ventral plate with distinct proximal and distal
margins; gonostylar lobe with smooth transition into the main body of gonostylus
..... *P. miyazakiensis* sp. n. (Fig. 30)
- 19 Gonostyli with extremely long, slender main body directed distad, its tooth-bearing
inner lobe directed inwards *P. bihamata* Mam. & Zaitz.
- Gonostyli different 20
- 20 Gonostyli heavy, almost triangular in overall shape, with small, setose lobe inside
and elongate, tooth-bearing lobe dorsoproximally *P. lobata* Yuk. (Fig. 32)
- Gonostyli not so heavy, rounded, with long, hairy lobe inside and broad, rounded
lobe without tooth dorsoproximally *P. trifida* sp. n. (Fig. 33)
- 21 Gonocoxites with setose swellings at both sides of its ventral emargination, or ventral
emargination absent; gonostyli with dorsal lobe which is tooth-like itself or has a
tooth-like structure distally 22
- Gonocoxites without swellings; gonostyli without dorsal lobe of such structure ... 25
- 22 Antennal flagellomeres with 1 whorl of sensory hairs *P. ornata* sp. n. (Fig. 45)
- Antennal flagellomeres with 2 whorls of sensory hairs 23
- 23 Gonocoxites without ventral emargination, instead with pubescent membranous
portion *P. ryukyuensis* sp. n. (Fig. 46)
- Gonocoxites with ventral emargination 24
- 24 Tegmen wider distally than proximally; gonocoxal emargination deep
..... *P. obesa* sp. n. (Fig. 44)
- Tegmen narrower distally than proximally; gonocoxal emargination shallow
..... *P. austrina* sp. n. (Fig. 45)
- 25 Gonostyli with apical tooth, or dense brush of spine-like hairs, or 3 strong spines
apically / subapically 26
- Gonostyli without such apical structures 32
- 26 Gonostyli with 3 strong spines apically / subapically ... *P. ayaensis* sp. n. (Fig. 56)
- Gonostyli different 27

- 27 Gonostyli with apical tooth 28
- Gonostyli with dense brush of spine-like hairs 31
- 28 Tegmen with loop-like membranous structure distally, its ventral plate rather indistinct; with 2 rows of postocular bristles *P. fungicola* (Kief.)
- Tegmen different; with 1 row of postocular bristles 29
- 29 Gonostyli clearly tapering to tip when seen from above *P. photophila* (Felt)
- Gonostyli as wide distally as proximally or even wider when seen from above 30
- 30 Ventral plate of tegmen narrower than tegmen itself, with sclerotized sculpture in centre *P. revelata* Mam. et Ber. (Fig. 49)
- Ventral plate of tegmen as wide or wider than tegmen itself, without sclerotized sculpture *P. truncata* Yuk.
- 31 Gonostyli with inner lobe having a dense cover of strong hairs *P. lobuscorum* sp. n. (Fig. 48)
- Gonostyli without inner lobe, maximally slightly bulbous inside *P. muscorum* (Kief.)
- 32 Tergite 9 with angular, pubescent lobes distolaterally (that may be turned inwards and thus hardly visible) 33
- Tergite 9 without distolateral lobes 35
- 33 Gonostyli wedge-shaped in distal third *P. sphenoides* sp. n. (Fig. 7)
- Gonostyli cylindrical in distal third 34
- 34 Gonocoxites with its ventral emargination extending to one third of gonocoxites length *P. subborealis* Jasch.
- Gonocoxites with very shallow ventral emargination extending to less than one third of gonocoxites length *P. maetoi* sp. n. (Fig. 6)
- 35 Tegmen with membranous, pubescent lobe ventrally that may be hardly visible behind the gonocoxites 36
- Tegmen without such lobe 44
- 36 Antennal flagellomeres with 2 whorls of sensory hairs *P. fagiphila* Jasch.
- Antennal flagellomeres with 1 whorl of sensory hairs 37
- 37 Strong anterior portion of C extends point of intersection with R5 for 4-5 times the vein width of R5 *P. spinosa* sp. n. (Fig. 26)
- Strong anterior portion of C extends point of intersection with R5 for maximally 2 times the vein width of R5 38
- 38 Gonostyli wedge-shaped and with strong, almost scale-like setae distally *P. boreojaponica* sp. n. (Fig. 10)
- Gonostyli different 39
- 39 Membranous lobe of tegmen having its pubescence arranged in groups and rows *P. pumila* sp. n. (Fig. 14)
- Membranous lobe of tegmen having its pubescence irregularly arranged 40
- 40 Gonostyli slender, clearly tapering to tip; tegmen widened and dorsad directed in distal half *P. aleemkhani* sp. n. (Fig. 8)
- Gonostyli and tegmen different 41
- 41 Gonostyli heavy, elongate, tapering to tip; tegmen tapering to tip, its ventral plate absent *P. autumnalis* sp. n. (Fig. 9)
- Gonostyli and tegmen different 42
- 42 Gonostyli flattened, rhombic when seen from above; gonocoxites with ventral emargination extending beyond its midlength *P. rhombica* sp. n. (Fig. 15)
- Gonostyli different; gonocoxites with ventral emargination extending to less than its midlength 43
- 43 Gonostyli slightly bulbous inside, in distal third suddenly tapering to tip; tegmen with fan-shaped, sclerotized ventral plate distally and membranous collar along its side margins *P. okochii* sp. n. (Fig. 13)

- Gonostyli evenly cylindrical, or slightly and evenly tapering to tip; tegmen with short, membranous ventral plate formed like a horseshoe and without collar along its sides *P. caricis* (Kief.) (Figs. 11, 12)
- 44 Ocelli absent *P. anocellata* sp. n. (Fig. 35)
- Ocelli present 45
- 45 Tegmen wide and angular distally, with bare, membranous lobe ventrally *P. angulata* sp. n. (Fig. 55)
- Tegmen different 46
- 46 Tegmen extremely big-sized, extending beyond both distal and proximal margins of gonocoxites; gonocoxites very long *P. valens* sp. n. (Fig. 57)
- Tegmen and gonocoxites different 47
- 47 Gonocoxites with dorsodistal lobes extremely long and sharply angled *P. albicornis* (Meig.)
- Gonocoxites without such lobes 48
- 48 Antennal flagellomeres with 1 whorl of sensory hairs 49
- Antennal flagellomeres with 2 or 2,5 whorls of sensory hairs, or sensory hairs not clearly arranged in whorls but separated into one distal and one proximal group ... 58
- 49 Whorl of sensory hairs consisting of fine, long hairs that easily break, this whorl always situated distally 50
- Whorl of sensory hairs consisting of strong, long hairs that exceptionally break, this whorl situated medially to distally 55
- 50 Thorax strikingly flat and long; tegmen with strongly sclerotized rib dorsoproximally *P. tsukubasanensis* sp. n. (Fig. 41)
- Thorax and tegmen without such modifications 51
- 51 Tegmen without ventral plate; gonostyli with rounded, setose lobe dorsobasally *P. cassa* sp. n. (Fig. 37)
- Tegmen and gonostyli different 52
- 52 Tegmen slender, parallel-sided or head-like widened distally 53
- Tegmen heavy, tapering to tip in distal half, never widened distally 54
- 53 Gonostyli with long basolateral apodeme; with 1 row of postocular bristles *P. nemorum* (Edw.)
- Gonostyli with short basolateral apodeme; with 2 rows of postocular bristles *P. modesta* (Felt)
- 54 Tegmen long, spoon-like widened distally *P. capitata* sp. n. (Fig. 52)
- Tegmen shorter, not or slightly widened distally *P. sanguinea* (Kief.)
- 55 With 1 row of postocular bristles 56
- With 2 rows of postocular bristles 57
- 56 Gonostyli straight; ventral plate of tegmen with distinct, sclerotized proximal margin *P. semota* sp. n. (Fig. 16)
- Gonostyli slightly curved inwards; ventral plate of tegmen with almost invisible proximal margin *P. horridula* Jasch.
- 57 Gonostyli fairly small, much shorter than gonocoxites, with dense cover of long hairs distally; gonocoxites with ventral emargination extending beyond its midlength *P. pilosa* sp. n. (Fig. 53)
- Gonostyli heavy, as long as gonocoxites, without dense cover of hairs; gonocoxites with ventral emargination extending to less than its midlength *P. montivaga* sp. n. (Fig. 39)
- 58 Nodes of antennal flagellomeres with one distal and one proximal group of sensory hairs that are not arranged in distinct whorls; ventral plate of tegmen strongly sclerotized and strikingly cut distally *P. ampla* sp. n. (Fig. 34)
- Nodes of antennal flagellomeres with their sensory hairs arranged in whorls; ventral plate of tegmen different 59
- 59 Antennal sensory hairs arranged in 2 complete distal and 1 incomplete medial whorl

- *P. ogawaensis* sp. n. (Fig. 40)
- Antennal sensory hairs arranged in maximally 2 whorls 60
- 60 Antennal sensory hairs arranged in 2 distal whorls, both whorls consisting of fine, long sensory hairs *P. gotohi* sp. n. (Fig. 19)
- Antennal sensory hairs arranged in 1 distal and 1 medial whorl 61
- 61 Gonocoxites with dorsodistal lobes almost triangular, setose and hairy
- *P. vernalis* sp. n. (Fig. 42)
- Gonocoxites without dorsodistal lobes 62
- 62 Gonostyli straight 63
- Gonostyli curved inwards 66
- 63 Gonostyli heavy, cylindrical, appear to be broader distally than proximally 64
- Gonostyli elongate, tapering to tip 65
- 64 Tegmen angular distally; gonostyli inside with extremely dense setation
- *P. ramosa* (Edw.)
- Tegmen rounded distally; gonostyli with comparably sparse, even setation
- *P. gryphiswaldensis* Jasch.
- 65 Ventral plate of tegmen with striking, strongly sclerotized proximal margin formed like a horseshoe *P. cornuta* (Edw.)
- Ventral plate of tegmen very weak, mainly visible by its distal margin
- *P. apposita* Jasch.
- 66 Tegmen strictly parallel-sided, along its side margins with distinct, pigmented stripes that join in distal third *P. perpusilla* (Winn.)
- Tegmen different 67
- 67 Tegmen without ventral plate or any other modifications
- *P. fujiensis* sp. n. (Fig. 50)
- Tegmen with ventral plate 68
- 68 Strong anterior portion of C extending beyond point of intersection with R5 for 3-4 times the vein width of R5 *P. ibarakiensis* sp. n. (Fig. 38)
- Strong anterior portion of C extending beyond point of intersection with R5 for 0-2 times the vein width of R5 69
- 69 Ventral plate of tegmen short, occupies one third or less of tegmen length 70
- Ventral plate of tegmen long, occupies almost full tegmen length 71
- 70 Strong anterior portion of C extending beyond point of intersection with R5 for 1-2 times the vein width of R5; with 1 row of postocular bristles
- *P. boreophila* sp. n. (Fig. 36)
- Strong anterior portion of C ending at point of intersection with R5; with 2 rows of postocular bristles *P. tundrae* Jasch.
- 71 Tegmen long, its ventral plate with clear contours along its full length
- *P. avia* sp. n. (Fig. 51)
- Tegmen shorter, its ventral plate with distinct distal and proximal margins but indistinct side margins *P. yezoensis* sp. n. (Fig. 54)

Species of *Peromyia* in Japan

Peromyia aurantiaca-group

Species of the *aurantiaca*-group are characterized by having their scutum with unsclerotized portions that form one to four bright, membranous dots (synapomorphy).

Six of eleven Holarctic species belonging to this group are known to occur in Japan. Four of them are here described as new to science. *Peromyia scutellata* Mam., described from Yamal, northwestern Siberia, should also belong here.

Peromyia bidentata Berest, 1988*Supplement to description. Male.*

Head: Postfrons setose.

Thorax/wings: Strong anterior portion of C extending point of intersection with R5 for 2-3 times the vein width of R5.

Abdomen: Pattern of sensory pores not quite certain but differing from the normal pattern found in *Peromyia*.

Genitalia: Gonostyli with 2 strong apical spines with the one stronger and sometimes little longer than the other, additionally with 1 subapical spine on dorsal side that is variable in size but always weaker than the apical spines.

Discussion. Japanese specimens of *bidentata* correspond widely with those described from Ukraine and Sweden. Their gonostyli have an additional weaker spine inserting subapically that is not present in the Swedish specimen described by Jaschhof (1998).

Distribution and biology. New record for Japan. Hk (Kk, Sr), Hn (Ak, Ib).

The few Japanese specimens originate from mature deciduous forests within and north of the beech zone, and a subalpine forest dominated by fir, *Abies sachalinensis*. These central and northern Japanese collecting sites were situated between 400 and 800 m above sea level (in the following, a. s. l.). Flight period: Hk: VII; Hn: V-VI.

Material studied (4 males). Hk: Kk, Ishikari Mts., Higashikawa Town, Tenninkyo hot spring, 22 July 1999, leg. Jaschhof, 1 male, no. A0413; Sr, Yubari Mts., Ashibetsu City, 5 July 1999, leg. Jaschhof, 1 male, no. A0414; Hn: Ak, Minehama Village, Shirakami Mts., Mizusawa River Valley, 22 June 1999, leg. Jaschhof, 1 male, no. A0455; Ib, Kitaibaraki City, Sadanami, Ogawa Research Forest, 11 May-1 June 1999, leg. Jaschhof, 1 male, no. A1519.

Peromyia bipuncta sp. n.

(Figs. 2A-D)

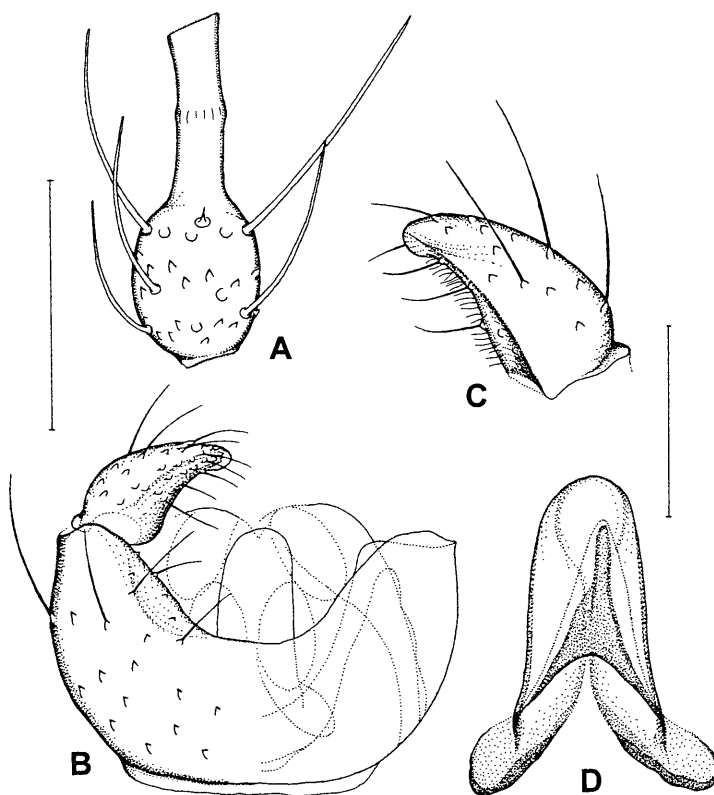
Male. Body size: 1.1 mm.

Head: Postfrons non-setose. Eye bridge 1-2 facets long laterally and 3 facets at vertex. With 1 sparse row of postocular bristles. Antennae with 12 flagellomeres; terminal flagellomere constricted and with additional small node. Flagellomere 4 (Fig. 2A) with neck longer than node; node with irregular single to triple whorl of short setae basally, next to it with irregular single to double whorl of long setae, among the setae with irregularly arranged sensory hairs of various length, distally with whorl of long sensory hairs and a few sensory spines. Palpi 3 to 4-segmented (even in the single specimen available).

Thorax: Scutum with sparse lateral and dorsocentral rows of setae, setose portions distinctly lighter than rest of scutum, with 1 large light, membranous dot between scutum and scutellum and 1 much smaller and circular dot on posterior scutum. Empodia as long as claws. Claws with approximately 3 fine teeth. Wings: R1 = 3.5 rs, strong anterior portion of C extending point of intersection with R5 for 2 times the vein width of R5.

Abdomen: Pattern of tergal plaques uncertain.

Genitalia: Gonocoxites (Fig. 2B) covered with setae ventrally, its distal margin with wide, U-shaped emargination not extending to midlength of gonocoxites. Gonostyli (Figs. 2B, C) clearly tapered to tip and curved inwards, covered with long setation that becomes shorter and denser apically, with inconspicuous, plate-like apical tooth. Tegmen (Fig. 2D) almost parallel-sided, rounded distally, with elongate, almost triangular ventral plate sclerotized in its centre. Tergite 9 rather long, with medial interruption of sclerotization, with interrupted row of setae along distal margin. Tergite 10 distinct, bilobed, densely pubescent. Sternite 10 bilobed, densely pubescent.



Figs. 2A-D: *Peromyia bipuncta* sp. n., male; A: flagellomere 4, lateral view (0.1 mm); B: genitalia, ventral view (0.1 mm); C: gonostylus, dorsal view (0.05 mm); D: tegmen, ventral view (0.05 mm). A-D: holotype. (In parentheses: length of scale bar.)

Female. Unknown.

Types. Holotype: male, no. A1392, Japan, Honshu, Ibaraki Pref., Kitaibaraki City, Sadanami, Ogawa Research Forest, in mature, mixed deciduous forest dominated by beech (*Fagus crenata*), 600 m, 18 April-3 May 1999, by Malaise trap, leg. Jaschhof [in KUEC].

Discussion. *Peromyia bipuncta* is the only group member that has its male genitalia with tooth-bearing gonostyli, even when this tooth is fairly inconspicuous. Apart from *bipuncta*, gonostylar teeth in *Peromyia* are rare and are found only in species of the *palustris*-group.

Distribution and biology. Hn (Ib).

For details of habitat and flight period, see under holotype.

Etymology. The name refers to the scutum having two light, membranous dots in this species (in Latin: *bipuncta* = with two dots).

***Peromyia imperatoria* sp. n.**

(Figs. 3A-E)

Male. Body size: 1.0 mm.

Head: Postfrons non-setose. Eye bridge 1-2 facets long laterally and 3 facets at vertex. With 1 row of postocular bristles. Antennae with 12 flagellomeres; terminal flagellomere

constricted and with additional small, ovoid node. Flagellomere 4 (Fig. 3A) with neck longer than node; node with single to triple whorl of short setae basally, next to it with double to triple whorl of long setae, medially with irregular whorl of short sensory hairs, distally with irregular whorl of long sensory hairs and a few sensory spines. Palpi 4-segmented, terminal segment as long as or little longer than third, distal 2 segments incompletely fused in one of the specimens studied, also second and third segments with some sensory hairs.

Thorax: Scutum with lateral and dorsocentral rows of setae, setose portions distinctly lighter than rest of scutum, posterior scutum (Fig. 3B) with 1 (or possibly 2) small and 2 large, light membranous dots (so in holotype), or with only 2 large dots, or all dots obviously lacking. Empodia as long as claws. Claws with minute, hardly visible teeth. Wings: R1 = 2.5-3.5 rs, strong anterior portion of C ending at point of intersection with R5.

Abdomen/pattern of tergal plaques: 0 / 2 / 2 / 2 / 2 / 1 / 0 / 0.

Genitalia: Gonocoxites (Fig. 3C) heavy, strikingly long, covered with setae ventrally except their membranous central and most proximal portions, its distal margin with wide and shallow U-shaped emargination. Gonostyli (Figs. 3C, E) fairly small, elongate, slightly curved inwards, in particular, in distal third where they are tapered, setose elsewhere and with apical brush of very strong, spine-like hairs. Tegmen (Fig. 3D) very heavy, broadest at midlength, with short but strong, horseshoe-shaped ventral plate in centre. Tergite 9 short, forming a sclerotized semicircle with medial interruption of sclerotization, with row of setae along distal margin. Tergite 10 bilobed, densely pubescent and with fine setae. Sternite 10 large and distinct, bilobed, densely pubescent.

Female. Body size: 1.2 and 1.8 mm.

Head: Antennae with scape and pedicel of about same size, with 9 flagellomeres; terminal flagellomere slightly constricted resulting in additional small node. Flagellomere 4 with ovoid node and with neck a little shorter than node; node with single to double whorl of short setae basally, next to it with irregular whorl of long setae, medially with 4 strong sensory hairs, distally with a few sensory spines and fine sensory hairs.

Genitalia: Spermathecae 2, very large and sclerotized, disc-shaped and circular, without pores.

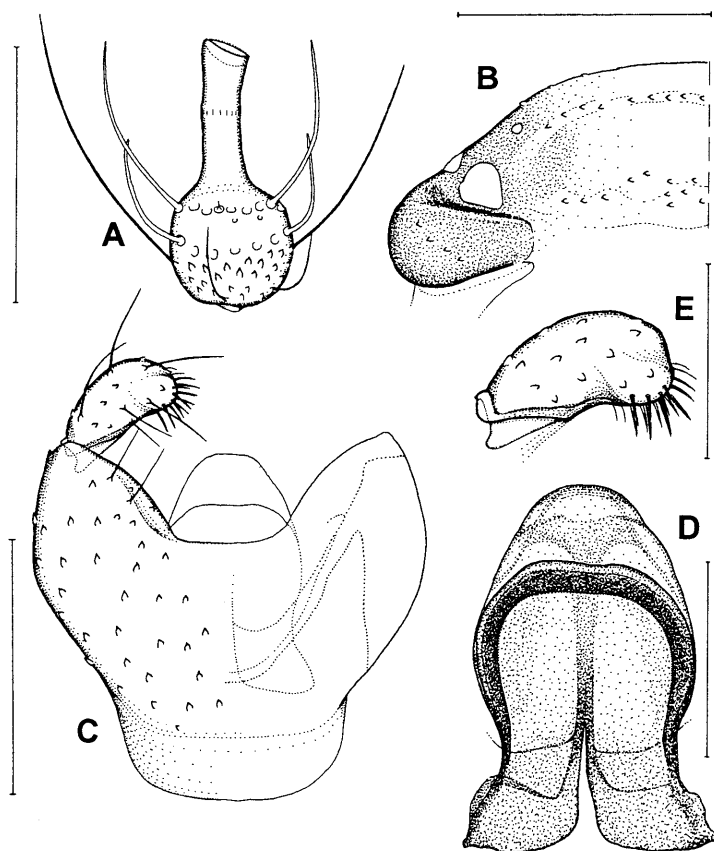
Types. Holotype: male, no. A0227, Japan, Honshu, Tokyo City, Imperial Palace Gardens, mixed deciduous / evergreen broad-leaved forest with conifers, 16 Nov. 1998, by sweepnet and exhaustor, leg. Jaschhof [in KUEC]. Paratypes: 2 males, 2 females, no. A0228-A0231, same data as holotype [no. A0231 in KUEC, the others in ZIMG].

Discussion. This new species is extremely similar and very close to *P. neomexicana*. Even in the structure of male genitalia the two species correspond largely except for some details. *Peromyia imperatoria* differs from *neomexicana* (in parentheses) as follows: gonocoxites have its most proximal portion set off, narrow and non-setose (most proximal portion largely unmodified); gonostyli are clearly curved and tapered to tip and having their apical hairs very strong (gonostyli less curved and tapered and having their apical hairs weaker); tegmen is heavier and broader and with short but distinct ventral plate (tegmen not so heavy, its ventral plate is hardly visible except the distal margin, when completely visible then the ventral plate is almost as long as wide). See also *P. tripuncta* described below. The females of *imperatoria* are indistinguishable from those of *neomexicana* (see below). Variation in the pattern of mesonotal dots is remarkable but finds its parallel in *P. neomexicana*.

Distribution and biology. Hn (Ib, To, Ky), Ry-Km, Ry-Ow.

The few specimens known of *imperatoria* were captured in evergreen broad-leaved forests as well as in various rather small, isolated forests of partly mixed deciduous, evergreen broad-leaved and coniferous trees. Flight period: Hn: IV, X-XI; Ry: III.

Etymology. The name is an allusion to the type locality (in Latin: *imperatoria* =



Figs. 3A-E: *Peromyia imperatoria* sp. n., male; A: flagellomere 4, lateral view (0.1 mm); B: part of mesonotum, dorsolateral view (0.2 mm); C: genitalia, tergites 9 and 10 and sternite 10 omitted, ventral view (0.1 mm); D: tegmen, ventral view (0.05 mm); E: gonostylus, ventral view (0.05 mm). A-E: holotype. (In parentheses: length of scale bar.)

imperial).

Other material studied (8 males). Hn: Ib, Kukizaki Town, Matsunosato, 11 April 1996 and 1995 (without specification), leg. Isono, 2 males, no. A0856-A0857; same locality, but 21-28 April 1999, leg. Jaschhof, 1 male, no. A1261; Ky, Kyoto City, Fushimi, Momoyama, mid-Oct.-mid-Nov. 1999, leg. Fujita, 1 male, no. A1164; Ry: Km, Yaku Island, Kamiyaku Town, Miyanoura, 27 March 1968, leg. Yukawa, 1 male; same locality, but 28 March 1968, 1 male; Ok, Iriomote Island, Urauchigawa River Valley, 7 March 1999, leg. Jaschhof, 1 male, no. A0345; Iriomote, Komi Village, Maera River Valley, 9 March 1999, leg. Jaschhof, 1 male, no. A0346.

Peromyia neomexicana (Felt, 1913)

Supplement to description. Male.

Head: Postfrons non-setose. Postocular bristles sometimes arranged in 2 rows with the second row short and irregular.

Abdomen/pattern of tergal plaques: 0/2/2/2/1-2/0-1/0/0.

Female. See discussion.

Discussion. There is some variation in the *neomexicana* specimens studied. The pair of small mesonotal dots may be absent or minute and circular. The pair of large mesonotal dots may be hardly visible in some poorly sclerotized specimens or in those kept in alcohol for many years. Gonostyli have their apical brush of strong hairs variable in density and extent. The female of *neomexicana* was previously described on the basis of a single specimen with somewhat doubtful identity (cf. Jaschhof 1998: 441-442). Females of *neomexicana* studied here were captured together with males and thus I have no doubt that they were correctly referred to this species. They fit the description given by Jaschhof (l. c.) except that they have two spermathecae. As in males, the smaller mesonotal dots may be absent.

Distribution and Biology. Hk (So), Hn (Iw, Ib, Tc, Ky, Wa, Hy), Ku (Fu, Kt, Oi, Mz, Km), Ry-Km, Ry-Ow.

Specimens of *neomexicana* were collected in various types of forest, such as evergreen broad-leaved, deciduous (with and without beech, or mixed with conifers), and subalpine. A few additional adults were taken over rotting oak logs for mushroom cultivation (shiitake, *Lentinus edodes*). *Peromyia neomexicana* was found in elevations up to 1200 m a. s. l. Flight period: Hk: VII; Hn: IV-VI, IX-XI; Ku: IV-V, X; Ry: III.

Material studied (68 males, 7 females). Hk: So, Rishiri Island, Rishiri Town, 13 July 1999, leg. Jaschhof, 1 male, no. A0419; Hn: Iw, Morioka City, Kuriya River, 26 May 1968, leg. Yukawa, 1 male; Iw, Tamayama Village, Koma, 26 May-15 June 1999, leg. Gotoh, 2 males, no. A0854-A0855; Tc, Okunikko, Marunuma Lake, 2 June 1968, leg. Yukawa, 1 male; Hy, Mt. Hyonosen, 28 Sept. 1995, leg. Jaschhof & Yagi, 1 male, no. A0143; Ib, Kitaibaraki City, Sadanami, Ogawa Forest, 14-27 May 1996, leg. Maeto, 1 male, no. A0418; Kukizaki Town, Matsunosato, 18 April, 25 April, 2 May, 11 Oct. and 17 Oct. 1995, leg. Isono, 10 males, 7 females, no. A0839-A0849; Ky, Kyoto City, Fushimi, Momoyama, mid-Oct.-mid. Nov. 1999, leg. Fujita, 1 male, no. A1165; Ku: Kt, Kumamoto City, Tatsudayama Experimental Forest, 21 April-31 May 1999, leg. Ito, 1 male, no. A1117; Oi, Taketa, 13 Oct. 1995, leg. Jaschhof, 2 males, no. A0144-A0145; Mz, Takachiho Town, 15 Oct. 1999, leg. Jaschhof, 3 males, no. A0850-A0851; Morotsuka Village, 16 Oct. 1999, leg. Jaschhof, 1 male, no. A0853; Km, Hiyoshi Town, Kamino River, 5 April 1968, leg. Yukawa, 1 male; Kagoshima City, Mt. Shiro, 19 April 1978, leg. Yukawa, 1 male; Kagoshima City, Ono Town, 17 April 1978, leg. Ikenaga, 1 male; Ry: Km, Yaku Island, Kamiyaku Town, Miyamura, 27 March 1968, leg. Yukawa, 21 males; same data, but 28 March 1968, 13 males; Yaku Island, Yaku Town, Mugio, 29 March 1968, leg. Yukawa, 2 males; Yaku Town, Anbou, 31 March 1968, leg. Yukawa, 1 male; Amami Oshima, Kawauchi Village, Kamiya Forest, 26 March 1999, leg. Jaschhof, 2 males, no. A0416-A0417; Ow, Iriomote Island, Urauchigawa River Valley, 7 March 1999, leg. Jaschhof, 1 male, no. A0415.

Peromyia puncta sp. n.

(Figs. 4A-D)

Male. Body size: 0.8-1.0 mm.

Head: Postfrons non-setose. Eye bridge 1-2 facets long laterally and 2-3 facets at vertex. With 1 row of postocular bristles. Antennae with 12 flagellomeres; terminal flagellomere constricted and with small additional node. Flagellomere 4 (Fig. 4A) with neck longer than node; node with single to triple whorl of short setae basally, next to it with double to triple whorl of long setae, among the setae with scattered, short sensory hairs, distally with irregular whorl of long sensory hairs and a few sensory spines and single fine sensory hairs. Palpi 3 to 4-segmented.

Thorax: Scutum with lateral and dorsocentral rows of setae, posterior scutum with large, light membranous dot. Empodia as long as claws. Claws probably without teeth (that are covered by scales in the specimens available). Wings: R1= 2.5-3 rs, strong

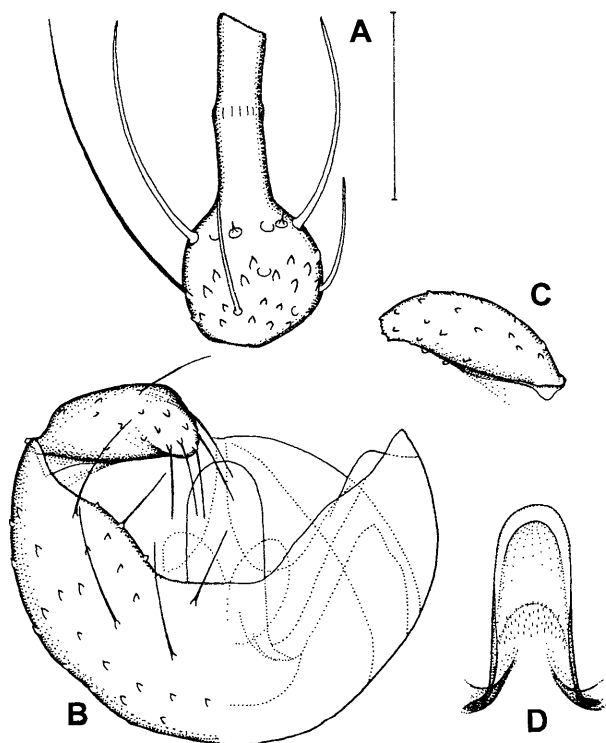
anterior portion of C extending point of intersection with R5 for 3-4 times the vein width of R5.

Abdomen/pattern of tergal plaques: Hardly visible, but probably 0 / 2 / 2 / 2 / 1 / 0-1 / 0 / 0.

Genitalia: Gonocoxites (Fig. 4B) covered with setae and a few scales ventrally, its distal margin with wide and shallow U-shaped emargination. Gonostyli (Figs. 4B, C) elongate, with their tips directed ventrad, slightly curved inwards and tapered near apex, its setation denser apically than elsewhere. Tegmen (Fig. 4D) elongate, parallel-sided, with rounded distal margin, with weak ventral plate almost extending to full length of tegmen, ventrally with inconspicuous pubescent lobe that extends maximally to midlength of tegmen. Tergite 9 short, forming a sclerotized semicircle with medial interruption of sclerotization, with row of setae along distal margin. Tergite 10 large, bilobed, densely pubescent and with a few fine setae. Sternite 10 bilobed, densely pubescent.

Female. Unknown.

Types. Holotype: male, no. A0420, Japan, Honshu, Akita Pref., Fujisato Town, Shirakami Mts., Mt. Futatsumori, mature deciduous forest dominated by beech (*Fagus crenata*), 850-1000 m, 23 June 1999, by sweepnet, leg. Jaschhof [in KUEC]. Paratypes: 1 male, no. A0421, same data as holotype; 1 male, no. A0422, Honshu, Aomori Pref., Shichinohe Town, mature mixed deciduous forest dominated by beech (*Fagus crenata*),



Figs. 4A-D: *Peromyia puncta* sp. n., male; A: flagellomere 4, lateral view; B: genitalia, ventral view; C: gonostylus, ventral view; D: tegmen, ventral view. A, B, D: holotype, C: paratype from Okinawa. (Length of scale bar: 0.05 mm.)

300-400 m, 28 July 1999, by sweepnet, leg. Jaschhof; 1 male, no. A0423, Honshu, Osaka Pref., Mino, mixed evergreen broad-leaved / coniferous forest, 29 Sept. 1995, by sweepnet, leg. Jaschhof; 1 male, no. A0424, Ryukyu Islands, Okinawa Pref., Okinawa, Yambaru Peninsula, Yona Village, mature evergreen broad-leaved forest, 18 March 1999, by sweepnet, leg. Jaschhof [all in ZIMG].

Discussion. Within the *aurantiaca*-group, *puncta* is similar to the northern European *P. sylteffjordensis*. Both species share the simple genitalic structures lacking any striking features. *Peromyia puncta* is distinguished from *sylteffjordensis* (in parentheses) by its gonostyli that are slenderer, curved and tapered to tip (parallel-sided and broadly rounded at tip) and its tegmen having a ventral pubescent lobe (without such lobe) and lacking a distinct ventral plate (with distinct ventral plate).

Distribution and biology. Hn (Ao, Ak, Ib, Os), Ry-Ow.

Specimens of *puncta* were found to occur in various forest types, such as mature deciduous forests dominated by beech (*Fagus crenata*), mixed deciduous / coniferous, and evergreen broad-leaved. Another specimen originates from a plantation of sugi (*Cryptomeria japonica*) mixed with broad-leaved trees. *Peromyia puncta* stretches its distribution from sea level up to 1000 m a. s. l. Flight period: Hn: V-VII, IX; Ry: III.

Etymology. The name refers to the one light mesonotal dot in this species (in Latin: *puncta* = punctated, dotted).

Other material studied (1 male). Hn: Ib, Kitaibaraki City, Sadanami, Ogawa Forest, 14-27 May 1996, leg. Maeto, 1 male, no. A1390.

Peromyia tripuncta sp. n.

(Figs. 5A-E)

Male. Body size: 1.1 mm.

Head: Postfrons with 1 setae. Eye bridge 1-2 facets long laterally and 2-3 facets at vertex. With 2 rows of postocular bristles with the posterior row sparse and irregular. Antennae with 12 flagellomeres; terminal flagellomere constricted resulting in small additional node. Flagellomere 4 (Fig. 5A) with neck longer than node; node fairly broad, basally with numerous short setae mixed with short sensory hairs, next to it with double to triple whorl of long setae, distally with irregular and dense whorl of long sensory hairs and a few sensory spines. Palpi 4-segmented, terminal segment a little longer than third, also second and third segments with a few sensory hairs.

Thorax: Scutum with lateral and dorsocentral rows of setae, setose portions clearly lighter than rest of scutum, posterior scutum (Fig. 5B) with 2 large and 1 smaller, light membranous dots forming a striking pattern. Empodia as long as claws. Claws with 2-3 minute teeth. Wings: $R_1 = 2.5-3$ rs, strong anterior portion of C ending at point of intersection with R5.

Abdomen: Pattern of tergal plaques not quite certain, but probably 0 / 2 / 2 / 2 / 2 / 1 / 0 / 0.

Genitalia: Gonocoxites (Fig. 5C) covered with setae ventrally except for large membranous portion around the emargination and its most proximal portion, its distal margin with almost rectangular emargination extending to less than midlength of gonocoxites. Gonostyli (Fig. 5C) heavy, broadest beyond midlength resulting in somewhat club-shaped appearance, with rather short setae elsewhere and very dense setation in distal third. The tegmen (Fig. 5D) is superficially reminiscent of a men's silhouette in frontal view (with rounded "head" and broad "shoulders"), its ventral plate with corresponding contours and dark pigmentation along proximal margin, tegmen with sclerotized portion connecting the parameral apodemes. Tergite 9 (Fig. 5E) very short, forming a continuously sclerotized semicircle, with dense row of short setae along its distal margin. Tergite 10 bilobed, densely pubescent and with a few fine setae. Sternite 10 indistinct, bilobed, pubescent.

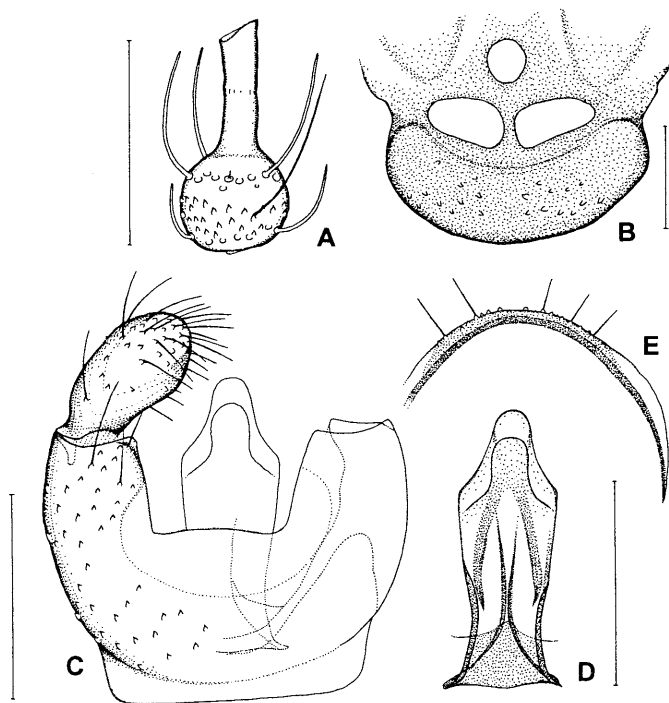
Female. Body size: 1.7 mm.

Head: Antennae broken in the one specimen available with maximally 6 flagellomeres remaining. Flagellomere 4 with ovoid node and neck of same length as node; node with double to triple whorl of short setae basally, next to it with irregular single to double whorl of long setae, medially with 4 strong sensory hairs, distally with a few sensory spines and fine sensory hairs.

Genitalia: Spermathecae 2, very large and well sclerotized, disc-shaped and circular, without pores.

Types. Holotype: male, no. A0244, Japan, Honshu, Tokyo City, Imperial Palace Gardens, mixed deciduous / evergreen broad-leaved forest with conifers, 16 Nov. 1998, by sweepnet and exhauster, leg. Jaschhof [in KUEC]. Paratypes: 3 males, 1 female, no. A0245-A0248, same data as holotype [all in ZIMG].

Discussion. Among species of the *aurantiaca*-group, *tripuncta* is characterized by its striking pattern of three light mesonotal dots found in both sexes (*P. imperatoria* also has three mesonotal dots but the anterior one is very small). The dots are not, or just weakly, visible in specimens from Yaku Island (see below), because these specimens have become very pale by storing in alcohol over many years. Male genitalia in *tripuncta*, in particular the tegmen, are quite distinct compared with that in other group members. Further, tergite 9 with its continuous sclerotization is exceptional in *Peromyia* species.



Figs. 5A-E: *Peromyia tripuncta* sp. n.; A: male flagellomere 4, dorsolateral view (0.1 mm); B: posterior female mesonotum, dorsal view (0.1 mm); C: male genitalia, tergites 9 and 10 and sternite 10 omitted, ventral view (0.1 mm); D: tegmen, ventral view (0.1 mm); E: tergite 9, dorsal view. A, C-E: holotype, B: paratype. (In parentheses: length of scale bar.)

Distribution and biology. Hn (To), Ry-Km.

The type series of *tripuncta* was collected in an isolated, mixed forest of deciduous, evergreen broad-leaved and coniferous trees in November. Additional material from Yaku Island was captured in a probably similarly structured forest in March.

Etymology. The name refers to the pattern of three light mesonotal dots (in Latin: *tripuncta* = three-punctated).

Other material studied (12 males). Ry: Km, Yaku Island, Kamiyaku Town, Miyanoura, 27 March 1968, leg. Yukawa, 6 males; same locality, but 28 March 1968, 6 males.

Peromyia borealis-group

Species of the *borealis*-group have their male tergite 9 with angular, pubescent lobes distolaterally, a character considered synapomorphic (cf. Jaschhof 1998: 444). Three of four Holarctic species belonging to this group occur in Japan, two of them are here described as new to science.

Peromyia maetoi sp. n.

(Figs. 6A-C)

Male. Body size: 0.9-1.0 mm.

Head: Postfrons non-setose. Eye bridge 2-3 facets long laterally and 3 facets at vertex. With 1 row of postocular bristles. Antennae with 12 flagellomeres; terminal flagellomere constricted resulting in small additional node. Flagellomere 4 (Fig. 6A) with neck a little longer than node; node with single to double whorl of short setae basally, next to it with double to triple whorl of long setae, medially with whorl of short sensory hairs, distally with irregular whorl of long sensory hairs and a few sensory spines. Palpi 3- (exceptionally 4-) segmented, also second segment (and third in case of the 4-segmented condition) with fairly long sensory hairs.

Thorax: Scutum with lateral and dorsocentral rows of setae. Empodia as long as claws. Claws without teeth. Wings: R1 = 2-2.5 rs, strong anterior portion of C extending beyond point of intersection with R5 for twice the vein width of R5.

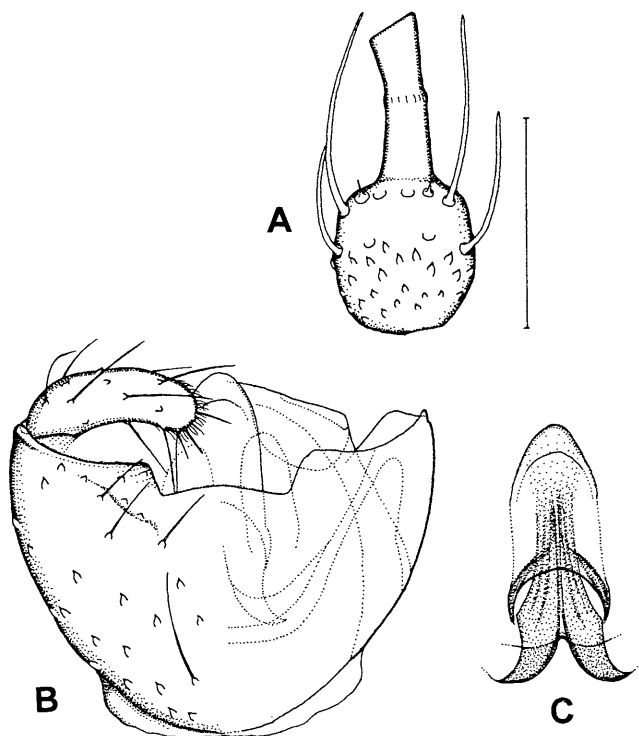
Abdomen: Pattern of tergal plaques uncertain.

Genitalia: Gonocoxites (Fig. 6B) covered with setae ventrally except its membranous central portion, its distal margin with very shallow emargination. Gonostyli (Fig. 6B) elongate, slightly curved in ventral view but flattened, at least in proximal half, when seen from above, with long setae elsewhere and 1-2 short, weak spines dorso-subapically. Tegmen (Fig. 6C) elongate, almost parallel-sided, with dark longitudinal bar becoming paler distally, its ventral plate with weakly sclerotized, horseshoe-shaped proximal margin and rounded distal margin that does not reach to tip of tegmen. Tergite 9 forming a sclerotized semicircle with medial interruption of sclerotization, its distolateral lobes turned inwards in all specimens available, with interrupted row of setae along distal margin. Tergite 10 and sternite 10 bilobed, densely pubescent.

Female. Unknown.

Types. Holotype: male, no. A0503, Japan, Honshu, Ibaraki Pref., Abukuma Highlands, Kitaibaraki City, Sadanami, Ogawa Forest, in secondary deciduous forest, 600 m, 6-20 Aug. 1996, by Malaise trap, leg. Maeto [in KUEC]. Paratypes: 4 males, no. A0504-A0507, same data as holotype [no. A0507 in KUEC, the others in ZIMG].

Discussion. In the specimens studied, the distolateral lobes of tergite 9 are turned inwards and are thus hardly visible, but I have no doubt that they exist and that this new species was correctly classified into the *borealis*-group. Genitalic structures in *P. maetoi*



Figs. 6A-C: *Peromyia maetoi* sp. n., male; A: flagellomere 4, ventrolateral view; B: genitalia, ventral view; C: tegmen, ventral view. A-C: holotype. (Length of scale bar: 0.05 mm.)

indicate the close relationship to *P. sphenoides* (see below), in particular, in that gonocoxites and tegmen in the two species correspond widely. Clear distinguishing characters refer to gonostyli, tergite 9, and antennal flagellomeres. Both *maetoi* and *sphenoides* are easily separated from previously known group members by their gonocoxites having the ventral emargination very shallow.

Distribution and biology. Hk (Ir), Hn (Ib).

Specimens of *maetoi* were collected in deciduous and mixed deciduous / coniferous forests up to 600 m a. s. l. Flight period: Hk: VII; Hn: VIII.

Etymology. The species epithet is to honour Dr Kaoru Maeto, forest entomologist and hymenopterist at the Forestry and Forest Products Research Institute, Shikoku Research Centre, Kochi. He generously supported my fieldwork and provided a great insect material collected by Malaise trapping in Ogawa Forest in 1996.

Other material studied (1 male). Hk: Ir, Chitose City, 5 km E Lake Shikotsuko, 24 July 1999, leg. Jaschhof, 1 male, no. A0508.

***Peromyia sphenoides* sp. n.**
(Figs. 7A-E)

Male. Body size: 0.9-1.0 mm.

Head: Postfrons non-setose. Eye bridge 2-3 facets long laterally and 3 facets at vertex. With 1 row of postocular bristles. Antennae with scape larger than pedicel; antennae broken in specimens available with maximally 8 flagellomeres remaining. Flagellomere 4 (Fig. 7A) with neck longer than node; node with single to triple whorl of short setae

basally, next to it with double to triple whorl of long setae, distally with irregular whorl of long sensory hairs and a few sensory spines. Palpi 3-segmented, terminal segment longest, also second segment with a few sensory hairs.

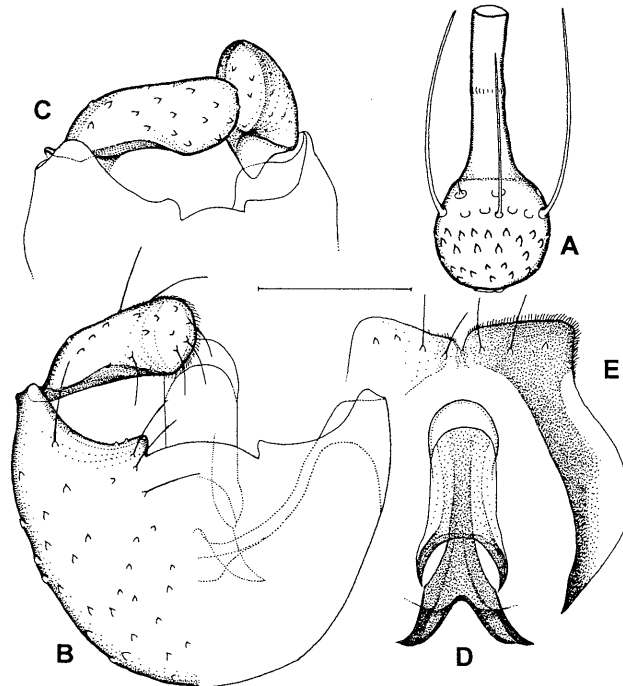
Thorax: Scutum with lateral and dorsocentral rows of setae. Empodia as long as claws. Claws without teeth. Wings: $R_1 = 2.5-3\text{ rs}$, strong anterior portion of C extending beyond point of intersection with R_5 for twice the vein width of R_5 .

Abdomen/pattern of tergal plaques: 0/2/2/2/2/1/0/0.

Genitalia: Gonocoxites (Fig. 7B) covered with setae ventrally except its membranous central portion, with its distal margin having the emargination very shallow. Gonostyli (Figs. 7B, C) elongate, straight, wedge-shaped in distal third, setose elsewhere. Tegmen (Fig. 7D) elongate, almost parallel-sided, with pigmented longitudinal bar becoming paler distally, its ventral plate with distinct, sclerotized, horseshoe-shaped proximal margin and rounded distal margin that does not extend to tip of tegmen. Tergite 9 (Fig. 7E) long, forming a sclerotized semicircle with medial interruption of sclerotization, with conspicuous distolateral pubescent lobes of rectangular shape, with interrupted row of setae along distal margin. Tergite 10 and sternite 10 bilobed, densely pubescent.

Female. Unknown.

Types. Holotype: male, no. A0232, Japan, Honshu, Ibaraki Pref., Abukuma Highlands, Kitaibaraki City, Sadanami, Ogawa Forest, in secondary deciduous forest, 600 m, 6-20 Aug. 1996, by Malaise trap, leg. Maeto [in KUEC]. Paratypes: 10 males,



Figs. 7A-E: *Peromyia sphenoides* sp. n., male; A: flagellomere 4, ventral view; B: genitalia, tergites 9 and 10 and sternite 10 omitted, ventral view; C: gonostyli, various positions in distorted slide mount; D: tegmen, ventral view; E: tergite 9, dorsal view. A, B and D: holotype, C and E: different paratypes. (Length of scale bar: 0.05 mm.)

no. A0233-A0242, same data as holotype [no. A0239-A0240 in KUEC, others in ZIMG].

Discussion. Within the *borealis*-group, *sphenoides* is best characterized by its male genitalia having the gonostyli long and wedge-shaped in distal third. See also *P. maetoi* (above).

Distribution and biology. Hn (Ib).

Peromyia sphenoides is known from a single central Japanese deciduous forest dominated by beech (*Fagus crenata*) and situated at 600 m a. s. l.. Flight period: Hn: VII-VIII.

Etymology. The name is Greek meaning "wedge-like", referring to the shape of gonostyli in this species.

Other material studied (5 males). Hn: Ib, Kitaibaraki City, Sadanami, Ogawa Forest, 9-25 July 1996, leg. Maeto, 1 male, no. A0243; same data, but 6-20 Aug. 1996, 4 males, no A0338-A0341.

***Peromyia subborealis* Jaschhof, 1997**

Discussion. Japanese specimens of *subborealis* fully correspond with those described from Germany (cf. Jaschhof 1997). Mamaev (1998b) considered *P. subborealis* a junior synonym of *Peromyia borealis* (Felt, 1919) by arguing that "slight differences in the length of tegmen are insufficient to describe new species". As outlined in the original description of *subborealis* (Jaschhof l. c.), there are several characters separating the two species (apart from tegmen, see structure of gonostyli and vestiture of antennal flagellomeres). *Peromyia subborealis* and *borealis* are undoubtedly different species.

Distribution and biology. Hk (Ir).

Japanese specimens of *subborealis* were captured once in a northern Japanese deciduous forest. Flight period: Hk: VII.

Material studied (2 males). Hk: Ir, Sapporo City, Toyohira, 29 June-26 July 1999, leg. Fukuyama & Jaschhof, 2 males, no. A1105-A1106.

***Peromyia caricis*-group**

Species of the *caricis*-group correspond in that their male genitalia have largely unmodified, cylindrical gonostyli and their tegmen is partly covered by a membranous, pubescent lobe. Additionally, the ventral plate of tegmen is reduced in size and forms a short, horseshoe-shaped structure. Even when most species included here are morphologically very similar and certainly form a monophyletic unit, strict arguments for their monophyly are not available.

Identification of *Peromyia* species belonging to the *caricis*-group is a most difficult task and perhaps almost impossible without having a good reference collection at hand. Most of its species are distinguished by only small differences in male genitalia. Such differences in gonostyli and tegmen are often hard to evaluate, because these structures tend to change its position (and thus its appearance) from slide-mount to slide-mount. Further, intraspecific variability even of genitalic characters seems to exist, depending both on body size and geographical origin of the specimens. The *caricis*-group appears to be one of the most species-rich groups within *Peromyia*. Apart from several new species described below, there are in my collection more than ten different "varieties" that might represent undescribed species. It is out of the scope of this study to describe in detail all these varieties, but one has to keep this fact in mind when identifying species of the *caricis*-complex.

Ten of at least 14 Holarctic species belonging here are distributed in Japan, eight of them are here described as new to science. Mamaev (1998b) considered both *Peromyia angellifera* Jaschhof, 1997 and *P. fagiphila* Jaschhof, 1997 synonym with *P. caricis*

(Kieffer, 1901), explained by intraspecific variability in *caricis* and the lack of characters sufficiently distinguishing among the three species. As explained by Jaschhof (1998: 447f., 452), both *angellifera* and, more readily, *fagiphila* can be separated from *caricis* by various distinguishing characters clear and stable in the numerous specimens studied. Consequently, I have no doubt that these three species have to be considered distinct. The neotype specimen of *Peromyia caricis* (cf. Jaschhof l. c.: 449) is figured and discussed in the respective species section.

***Peromyia aleemkhani* sp. n.**
(Figs. 8A-C)

Male. Body size: 0.7-0.9 mm.

Head: Postfrons non-setose. Eye bridge 1-2 facets long laterally and 2-3 facets at vertex. With 1 row of postocular bristles. Antennae with 12 flagellomeres; terminal flagellomere with sharp constriction resulting in additional smaller node. Flagellomere 4 (Fig. 8A) with neck longer than node; node with single to double whorl of short setae basally, next to it with double to triple whorl of long setae, medially, just beyond setae, with whorl of long sensory hairs, distally with single sensory spines and fine sensory hairs. Palpi 3 to 4-segmented, with the distal 3 segments equal in length or with the terminal segment shortest, with the proximal 2 segments having sensory hairs.

Thorax: Scutum with lateral and dorsocentral rows of setae. Empodia as long as claws. Claws at least in midlegs with 2 minute teeth. Wings: R1 = 2-2.5 rs, strong anterior portion of C ending at point of intersection with R5 or extending for once the vein width of R5.

Abdomen/pattern of tergal plaques: 0 / 2 / 2 / 2 / 1 / 1 / 0 / 0.

Genitalia: Gonocoxites (Fig. 8B) covered with setae and scales ventrally except for its membranous central portion, distal margin with emargination extending to midlength of gonocoxites, dorsal gonocoxal root slightly angled at base sometimes. Gonostyli (Fig. 7B) elongate and slender, broadest in proximal third and clearly tapering to tip, with its setation dense at apex but sparse elsewhere. Tegmen (Fig. 8C) with subbasal constriction, widest in distal half, with its distal portion directed dorsad, without modifications except a weak, membranous margin distally of the pubescent ventral lobe, the latter covering 4/5 of tegmen length. Tergite 9 short, forming a sclerotized semicircle with medial interruption of sclerotization, with interrupted row of setae along distal margin. Tergite 10 and sternite 10 bilobed, densely pubescent.

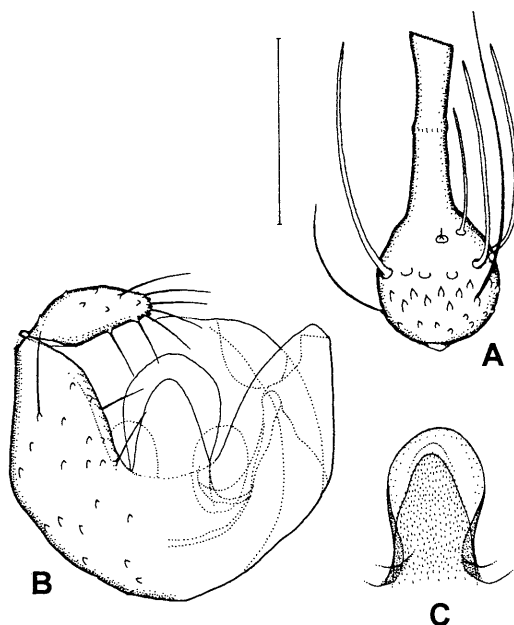
Female. Unknown.

Types. Holotype: male, no. A0353, Japan, Ryukyu Islands, Kagoshima Pref., Amami Oshima, Kawauchi Village, Kamiya Forest, in evergreen broad-leaved forest, 30 March 1999, by exhaustor, leg. Jaschhof [in KUEC]. Paratypes: 8 males, no. A0354-A0361, same data as holotype, but 26 March 1999 [no. A0360-A0361 in KUEC, the others in ZIMG].

Discussion. Within the *caricis*-group, this new species is distinct in its male genitalia having the tegmen wider distally than proximally and its gonostyli tapering to tip and with the setae concentrated apically. Some of the specimens studied, independent of their geographical origin, have their gonostyli longer and more sharply tapered to tip than others which is explained by intraspecific variability.

Distribution and biology. Hn (Ao, Ak, Hy), Sh (Ko), Ku (Ns, Km), Ry-Km, Ry-Ow.

Specimens of this new species were captured in various evergreen broad-leaved forests (sometimes mixed with conifers) as well as deciduous forests dominated by beech (*Fagus crenata*) in elevations up to 1200 m a. s. l. Flight period: Hn: VI-VII, IX; Sh: XI; Ku: IX-X; Ry: III.



Figs. 8A-C: *Peromyia aleemkhani* sp. n., male; A: flagellomere 4, lateral view; B: genitalia, ventral view; C: tegmen, ventral view. A-C: holotype. (Length of scale bar: 0.05 mm.)

Etymology. The species epithet is to thank Dr Aleem A. Khan, Dera Ghazi Khan, Pakistan, for his generous assistance in field work during my stay on Amami Oshima and to honour his efforts in protecting the natural woodland on this island.

Other material studied (32 males). Hn: Ao, Shichinohe Town, 28 July 1999, leg. Jaschhof, 1 male, no. A0456; Ak, Kazuno City, Goshogake Mts., Mt. Yakeyama, 21 June 1999, leg. Jaschhof, 1 male, no. A0457; Minehama Village, Shirakami Mts., Mizusawa River Valley, 22 June 1999, leg. Jaschhof, 7 males, no. A0458-A0464; Hy, Mt. Hyonosen, 28 Sept. 1995, leg. Jaschhof & Yagi, 1 male, no. A0381; Sh: Ko, Kochi City, Asakura, 11 Nov. 1998, leg. Jaschhof, 2 males, no. A0379-A0380; Ku: Ns, Sotome Town, 11 Oct. 1999, leg. Jaschhof, 1 male, no. A1178; Km, Mt. Kinpou, 18 Sept. 1995, leg. Jaschhof, 1 male, no. A0378; Ry: Km, Yaku Island, Kamiyaku Town, 27 March 1968, leg. Yukawa, 2 males; Amami Oshima, Uken Village, 27 March 1999, leg. Jaschhof, 4 males, no. A0362-A0365; same data, but 28 March 1999, 1 male, no. A0366; Ok, Iriomote Island, Urauchigawa River Valley, 7 March 1999, leg. Jaschhof, 6 males, no. A0367-A0372; Iriomote, Funaura, 8 March 1999, leg. Jaschhof, 4 males, no. A0373-A0376; Iriomote, Ohara, 8 March 1999, leg. Jaschhof, 1 male, no. A0377.

***Peromyia autumnalis* sp. n.**
(Figs. 9A-C)

Male. Body size: 0.8-0.9 mm.

Head: Postfrons non-setose. Eye bridge 2-3 facets long laterally and 3 facets at vertex. With 1 row of postocular bristles. Antennae broken in specimens available with maximally 10 flagellomeres remaining. Flagellomere 4 (Fig. 9A) with neck longer than node; node with single to double whorl of short scales basally, next to it with single to triple whorl of long setae, medially, just beyond setae, with whorl of long sensory hairs,

distally with a few sensory spines. Palpi 3-segmented, also second segment with a few sensory hairs, third segment slender and pointed.

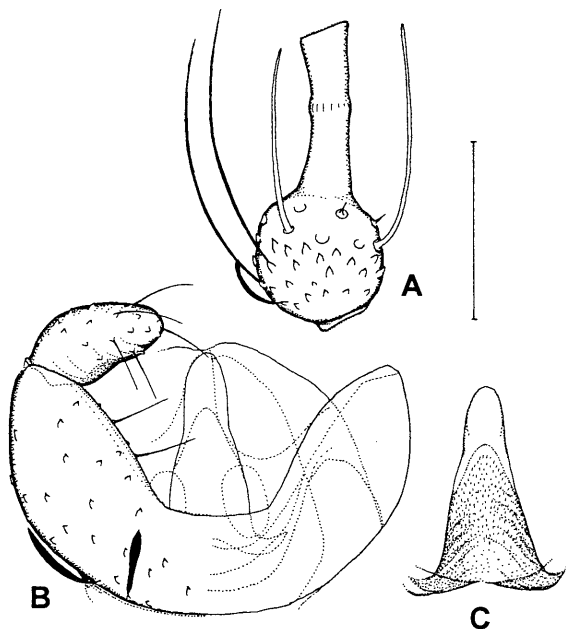
Thorax: Scutum with lateral and dorsocentral rows of setae. Empodia as long as claws. Claws without teeth. Wings: R1 = 3 rs, strong anterior portion of C ending at point of intersection with R5.

Abdomen/pattern of tergal plaques: 0 / 2 / 2 / 2 / 1 / 0 / 0 / 0.

Genitalia: Gonocoxites (Fig. 9B) covered with setae and scales ventrally except for its membranous central portion, its distal margin with emargination extending beyond midlength of gonocoxites, dorsal transverse bridge rather wide. Gonostyli (Fig. 9B) comparatively heavy, elongate, slightly tapering to tip and curved inwards, with long setae elsewhere. Tegmen (Fig. 9C) completely membranous and without any modifications, elongate and slender, tapering to tip, with its pubescent ventral lobe distinct and extending beyond midlength of tegmen, its pubescence irregularly arranged. Tergite 9 rather long, forming a sclerotized semicircle with medial interruption of sclerotization, with interrupted row of setae along distal margin. Tergite 10 and sternite 10 bilobed, densely pubescent, tergite 10 additionally with a few short setae.

Female. Unknown.

Types. Holotype: male, no. A1151, Japan, Kyushu, Miyazaki Pref., Aya Town, Aya Research Forest, in mature, evergreen broad-leaved forest, 400-600 m, 7 Oct. 1999, by exhaustor, leg. Jaschhof [in KUEC]. Paratypes: 1 male, no. A1152, same data as holotype; 1 male, no. A1153, same locality, but 6 Oct. 1999; 1 male, no. A1154, Nagasaki Pref., Sotome Town, in secondary evergreen broad-leaved forest dominated by evergreen oak (*Quercus* sp.), 400 m, 11 Oct. 1999, by exhaustor, leg. Jaschhof [all in ZIMG].



Figs. 9A-C: *Peromyia autumnnalis* sp. n., male; A: flagellomere 4, lateral view; B: genitalia, ventral view; C: tegmen, ventral view. A-C: holotype. (Length of scale bar: 0.05 mm.)

Discussion. Among species of the *caricis*-group, *autumnalis* is characterized by the combination of deeply excavated gonocoxites, rather heavy gonostyli, and the slender tegmen. The shape of tegmen is reminiscent of that in *P. pumila* (see below), but in the latter species gonostyli are much smaller and slenderer. Additionally, the ventral pubescent lobe covering the tegmen has its pubescence irregularly arranged in *autumnalis* while it is arranged in groups and rows in *pumila*.

Distribution and biology. Ku (Ns, Mz).

For details of habitat, see under types. Flight period: Ku: X.

Etymology. The name is Latin meaning "autumnal", referring to the season in which the type material was captured.

***Peromyia boreojaponica* sp. n.**
(Figs. 10A-D)

Male. Body size: 0.8-0.9 mm.

Head: Postfrons non-setose. Eye bridge 1-2 facets long laterally and 2-3 facets at vertex. With 1 row of postocular bristles. Antennae broken in specimens available with maximally 7 flagellomeres remaining. Flagellomere 4 (Figs. 10A, B) with neck much longer than node; node with single to double whorl of short setae basally that is sometimes incomplete dorsally, next to it with double to triple whorl of long setae, medially, just beyond setae, with ventral row or complete whorl of short sensory hairs which may be absent (so in holotype), distally with whorl of long sensory hairs and a few sensory spines. Palpi 4-segmented.

Thorax: Scutum with sparse lateral and dorsocentral rows of setae. Empodia as long as claws. Claws of midlegs with 2 minute teeth. Wings: R1 = 2-2.5 rs, strong anterior portion of C ending at point of intersection with R5.

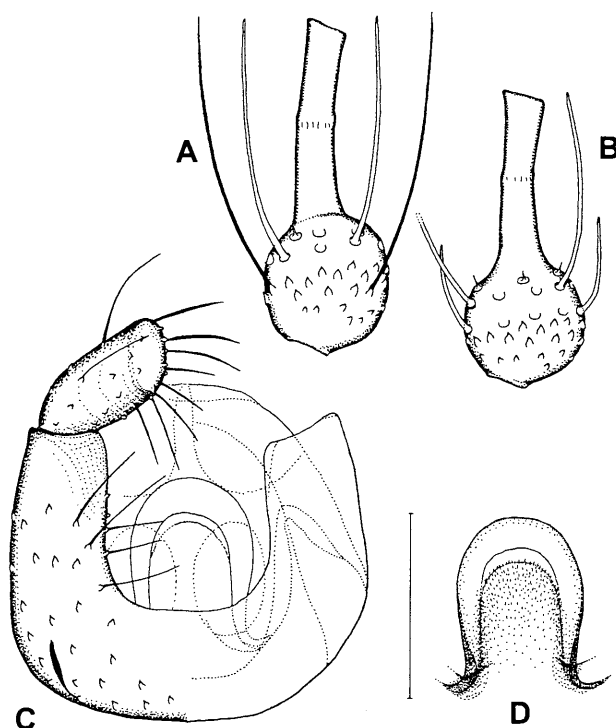
Abdomen: Pattern of tergal plaques uncertain.

Genitalia: Gonocoxites (Fig. 10C) narrow, covered with setae and scales ventrally except its membranous central portion, its distal margin with deep and wide U-shaped emargination extending beyond midlength of gonocoxites. Gonostyli (Fig. 10C) elongate, with their tips directed ventrad (thus looking shorter in certain slide-mounts), slightly wedge-shaped apically, with long setae elsewhere, distally with some setae very strong or scale-like, respectively. Tegmen (Fig. 10D) broad and short, almost parallel-sided and evenly rounded distally, without modifications except weak, membranous margin distally of the pubescent ventral lobe, the latter covering 4/5 of tegmen length. Tergite 9 rather long, forming a sclerotized semicircle with medial interruption of sclerotization, with interrupted row of long setae along distal margin. Tergite 10 large, sometimes extending beyond distal margin of tergite 9, bilobed, with dense, fairly long pubescence and a few short setae. Sternite 10 bilobed, densely pubescent.

Female. Unknown.

Types. Holotype: male, no. A0635, Japan, Hokkaido, Soya Sub-Pref., Rishiri Island, Rishiri Town, in subalpine forest dominated by fir (*Abies sachalinensis*), 200-300 m, 13 July 1999, by sweepnet, leg. Jaschhof [in KUEC]. Paratypes: 1 male, no. A0636, Hokkaido, Ashibetsu City, Yubari Highlands, in secondary, mixed coniferous / deciduous forest, 400 m, 5 July 1999, by sweepnet, leg. Jaschhof; 1 male, no. A0637, Honshu, Aomori Pref., Towadako Town, Tsuta hot spring, in mature, mixed deciduous forest dominated by beech (*Fagus crenata*), 500-600 m, 26 June-28 July 1999, by Malaise trap, leg. Jaschhof [all in ZIMG].

Discussion. Within the *caricis*-group, *boreojaponica* is characterized by its male genitalia having the gonocoxites very deeply and widely emarginated and the gonostyli long, wedge-shaped and with some of their apical setae very strong. Antennal flagellomeres in this species are unusual for its variable vestiture which is very rarely



Figs. 10A-D: *Peromyia boreojaponica* sp. n., male; A: flagellomere 4, ventrolateral view; B: dito, lateral view; C: genitalia, ventral view; D: tegmen, ventral view. A, C, D: holotype, B: paratype from Aomori Pref. (Length of scale bar: 0.05 mm.)

found in *Peromyia* species.

Distribution and biology. Hk (So, Sr), Hn (Ao).

For details of habitat, see under types. Flight period: Hk: VII; Hn: VII.

Etymology. The name is Latin meaning "northern Japanese", referring to the origin of the type material.

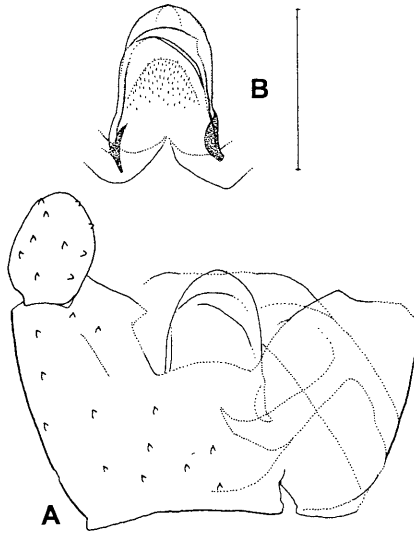
***Peromyia caricis* (Kieffer, 1901)**

(Figs. 11A, B, 12A-L)

Supplement to description. Male.

Abdomen/pattern of sensory pores: 0 / 2 / 2 / 2 / 1 / 1 / 0 / 0.

Discussion. The neotype specimen of *Peromyia caricis* has its genitalia pressed by coverglass resulting in that almost all structures are a little deformed (cf. Fig. 11). However, it shows which is considered species-specific in *caricis*: the gonostyli that are rather short and cylindrical, the tegmen that is almost parallel-sided, broadly rounded distally and with a short, horseshoe-shaped ventral plate in distal half, and the pubescent ventral lobe that extends beyond the midlength of tegmen. As previously described by Jaschhof (1998) on the basis of European specimens, these characters may vary and this is true for Japanese specimens too (cf. Fig. 12). As for gonostyli, they certainly vary in length (absolute and relative to their width) and probably, to less extent, in shape. Depending on their position in various slide-mounts, gonostyli appear to be almost



Figs. 11A, B: *Peromyia caricis* (Kieffer, 1901), neotype male; A: genitalia, ventral view, right gonostylus omitted; B: tegmen, ventral view. (Length of scale bar: 0.05 mm.)

parallel-sided in ventral view but a little tapered to tip if seen from above. That at least some of the differences in shape may be explained by artefacts becomes obvious when left and right gonostyli of one and the same specimen are compared (cf. Figs. 12B compared with 12C, 12E compared with 12F, and so on).

Distribution and biology. Hn (Iw, Ib, Yn, Hy), Sh (Ko), Ry-Km. Due to uncertainties in species identification, I do not consider here the Japanese records of *caricis* listed in Jaschhof (1998).

Specimens of *caricis* were captured in various forest types, such as subalpine, deciduous (with and without beech), and evergreen-broad-leaved, up to 2000 m a. s. l. Flight period: Hn: IV-VI, IX; Sh: XI; Ry: III.

Material studied (20 males). Hn: Iw, Tamayama Village, Koma, 15 June-4 July 1999, leg. Gotoh, 5 males, no. A1128-A1132; Ib, Kitaibaraki City, Sadanami, Ogawa Forest, 14-27 May 1996, leg. Maeto, 1 male, no. A0431; Kukizaki Town, Matsunosato, 21-28 April 1999, leg. Jaschhof, 1 male, no. A1262; Yn, Oyama Town, Mt. Fuji, 4-13 June 1999, leg. Jaschhof, 5 males, no. A1133-A1137; Hy, Mt. Hyonosen, 28 Sept. 1995, leg. Jaschhof & Yagi, 6 males, no. A0425-A0430; Sh: Ko, Kochi City, Hitsuzan, 7 Nov. 1998, leg. Jaschhof, 1 male, no. A1139; Ry: Km, Amami Oshima, Uken Village, 27 March 1999, leg. Jaschhof, 1 male, no. A1138.

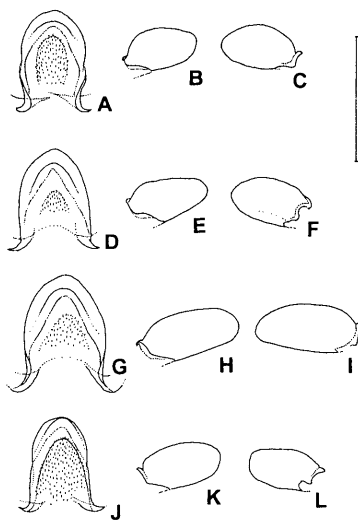
Peromyia fagiphila Jaschhof, 1997

Supplement to description. Male.

Head: Sometimes with a few postocular bristles forming a short, irregular second row. Abdomen/pattern of tergal plaques: 0 / 2 / 2 / 2 / 1 / 0-1 / 0 / 0.

Distribution and biology. Hk (Ir), Sh (Ko), Ku (Fu, Mz), Ry-Km.

Specimens of *fagiphila* were captured in various forest types, such as deciduous, mixed deciduous / coniferous, and evergreen broad-leaved, up to 700 m a. s. l. One specimen was taken over oak logs for mushroom cultivation (shiitake). Flight period: Hk:



Figs. 12A-L: *Peromyia caricis* (Kieffer, 1901), males; A, D, G, J: tegmen, ventral view; B, E, H, K: gonostylus, ventral view; C, F, I, L: gonostylus, dorsal view. A-C: specimen from Iwate Pref., D-F: from Ibaraki Pref., G-I: from Yamanashi Pref., J-L: from Amami Oshima. (Length of scale bar: 0.05 mm.)

VII-VIII(-IX?); Sh: XI; Ku: IV, X; Ry: III.

Material studied (11 males). Hk: Sapporo City, Toyohira, 29 June-26 July 1999, leg. Fukuyama & Jaschhof, 1 male, no. A1155; same locality, but 16 Aug.-13 Sept. 1999, 1 male, no. A1156; Ku: Fu, Saigawa Town, Mt. Sanda, 1-21 Oct. 1999, leg. Jaschhof, 2 males, no. A1159-A1160; Mz, Aya Town, Aya Research Forest, 5-20 Oct. 1999, leg. Jaschhof, 1 male, no. 1157; Morotsuka Village, 16 Oct. 1999, leg. Jaschhof, 1 male, no. A1158; Sh: Ko, Kochi City, Asakura, 11 Nov. 1998, leg. Jaschhof, 2 males, no. A0432-A0433; Ry: Km, Amami Oshima, Uken Village, 28 March 1999, leg. Jaschhof, 3 males, no. A0434-A0436.

***Peromyia okochii* sp. n.**

(Figs. 13A-E)

Male. Body size: 0.7-0.8 mm.

Head: Postfrons non-setose. Eye bridge 1-2 facets long laterally and 2-3 facets at vertex. With 1 row of postocular bristles. Antennae with 12 flagellomeres; terminal flagellomere with sharp constriction distally resulting in small additional node. Flagellomere 4 (Figs. 13A, B) with neck longer than node; node with single to double whorl of short setae basally that is sometimes incomplete dorsally, next to it with single to triple whorl of long setae, medially, just beyond setae, with whorl of long sensory hairs which may be very strong sometimes, distally with single sensory spines and fine sensory hairs sometimes. Palpi 4-segmented, segments gradually decreasing in length.

Thorax: Scutum with sparse lateral and dorsocentral rows of setae. Empodia as long as claws. Claws with 1-2 minute teeth at least in midlegs. Wings: R1 = 2.5-3 rs, strong anterior portion of C ending at point of intersection with R5 or extending for once the vein width of R5.

Abdomen/pattern of tergal plaques: 0 / 2 / 2 / 2 / 1 / 0-1 / 0 / 0.

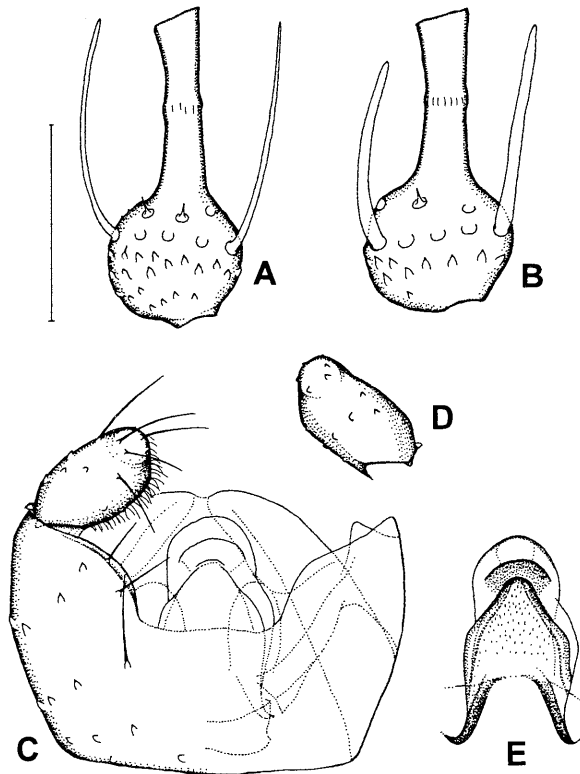
Genitalia: Gonocoxites (Fig. 13C) sparsely covered with setae ventrally except its membranous central portion, its distal margin with emargination extending to less or just

midlength of gonocoxites. Gonostyli (Figs. 13C, D) rather stout, slightly bulbous inside and (sometimes?) suddenly tapering in distal third, with long setae elsewhere and dense cover of short hairs inside. Tegmen (Fig. 13E) broadest at midlength, rounded apically, with sclerotized ventral plate of fan-like shape in distal half, with membranous collar along side margins, with the pubescent ventral lobe extending to 3/4 of tegmen length. Tergite 9 forming a sclerotized semicircle with medial interruption of sclerotization, with interrupted row of setae along distal margin. Tergite 10 and sternite 10 bilobed, densely pubescent, tergite 10 additionally with single short setae.

Female. Unknown.

Types. Holotype: male, no. A0490, Japan, Honshu, Ibaraki Pref., Abukuma Highlands, Kitaibaraki City, Sadanami, Ogawa Forest, in secondary deciduous forest, 600 m, 9-25 July 1996, by Malaise trap, leg. Maeto [in KUEC]. Paratypes: 5 males, no. A0491-A0495, same data as holotype [no. A0491 in KUEC, the others in ZIMG].

Discussion. Within the *caricis*-group, *okochii* is distinct in having the tegmen with a sclerotized, fan-shaped ventral plate in distal half and a membranous, V-shaped collar along the side margins. Additionally, the shape of its gonostyli, with slightly bulbous inner side and narrow apical third, is distinct even when hard to see in some specimens.



Figs. 13A-E: *Peromyia okochii* sp. n., male; A: flagellomere 4, lateral view; B: dito, dorsolateral view; C: genitalia, ventral view; D: right gonostylus separated, ventral view; E: tegmen, ventral view. A, C-E: holotype, B: specimen from Hokkaido. (Length of scale bar: 0.05 mm.)

Tegmen structure in *okochii* is not unlike that in *P. fagiphila* (see above), but the latter has its flagellomeres with two whorls of sensory hairs (instead of one in *okochii*). Three *okochii* specimens from Hokkaido (no. A0500-A0502) differ in that their antennal flagellomeres have the sensory hairs strikingly strong (Fig. 13B). I have never seen such extremely strong sensory hairs in any other *Peromyia* species. Four other specimens from northern Honshu (no. A1149-A1150, A1363-A1364) fit those of *okochii* described above, but their gonostyli are more elongate, cylindrical and sometimes slightly curved inwards. For the time being, I hesitate to consider them conspecific with *okochii* and leave them unidentified.

Distribution and biology. Hk (Iu), Hn (Ao, Ak, Ib).

Specimens of *okochii* were collected in deciduous forests within or north of the beech zone in elevations up to 600 m a. s. l. Flight period: Hk: VII; Hn: V-VII.

Etymology. The species epithet is to honour Dr Isamu Okochi, forest entomologist and herpetologist at the Forestry and Forest Products Research Institute, Tsukuba City, for generously supporting this project together with his colleagues of the Insect Management Laboratory.

Other material studied (12 males). Hk: Iu, Tomakomai City, Hokkaido University Experimental Forest, 30 June-26 July 1999, leg. Jaschhof, 3 males, no. A0500-A0502; Hn: Ao, Towadako Town, Tsuta hot spring, 26 June-28 July 1999, leg. Jaschhof, 2 males, no. A1147-A1148; Ak, Minehama Vill., Shirakami Mts., Mizusawa River Valley, 22 June 1999, leg. Jaschhof, 4 males, no. A0496-A0499; Ib, Mt. Tsukuba, 8 May 1999, leg. Jaschhof, 3 males, no. A1172-A1174.

Peromyia pumila sp. n.

(Figs. 14A-F)

Male. Body size: 0.6-0.8 mm.

Head: Postfrons non-setose. Eye bridge 1-2 facets long laterally and 2-3 facets at vertex. With 1 row of postocular bristles. Antennae with 12 flagellomeres; terminal flagellomere with sharp constriction resulting in small additional node. Flagellomere 4 (Fig. 14A) with neck longer than node; node with single to triple whorl of short scales basally, next to it with double to triple whorl of long setae, medially, just beyond setae, with whorl of long sensory hairs, distally with single sensory spines and fine sensory hairs sometimes. Palpi with 4 (exceptionally 3) segments, segments gradually decreasing in length, the proximal 2 or 3 with sensory hairs.

Thorax: Scutum with sparse lateral and dorsocentral rows of setae. Empodia as long as claws. Claws with 2 minute teeth at least in midlegs. Wings: R1 = 2-2.5 rs, strong anterior portion of C ending at point of intersection with R5 or extending for once the vein width of R5.

Abdomen/pattern of tergal plaques: 0 / 2 / 2 / 2 / 1 / 0-1 / 0 / 0.

Genitalia: Gonocoxites (Fig. 14B) covered with setae and scales ventrally except its membranous central portion, its distal margin with emargination extending to or beyond midlength of gonocoxites. Gonostyli (Figs. 14B, E, F) elongate, broadest in proximal third and sharply tapered to tip (but note the variability in shape, see discussion), sparsely setose elsewhere, sometimes with setation denser in apical third or with dense, long hairs inside and apically. Tegmen (Figs. 14C, D) clearly longer than wide, slightly tapering to tip, in distal third with 1-2 weak, membranous margins possibly indicating the presence of ventral plate, apex of tegmen weakly membranous and thus variable in shape but generally rounded, with pubescent ventral lobe extending beyond midlength of tegmen, its pubescence arranged in groups and rows. Tergite 9 short, forming a sclerotized semicircle with medial interruption of sclerotization, with interrupted row of setae along distal margin. Tergite 10 and sternite 10 bilobed, densely pubescent.

Female. Unknown.

Types. Holotype: male, no. A0274, Japan, Ryukyu Islands, Okinawa Pref., Iriomote Island, Komi Village, Maera River Valley, in mature, evergreen broad-leaved forest, 14 March 1999, by exhaustor, leg. Jaschhof [in KUEC]. Paratypes: 26 males, no. A0275-A0300, same data as holotype [no. A0296-A0300 in KUEC, the others in ZIMG].

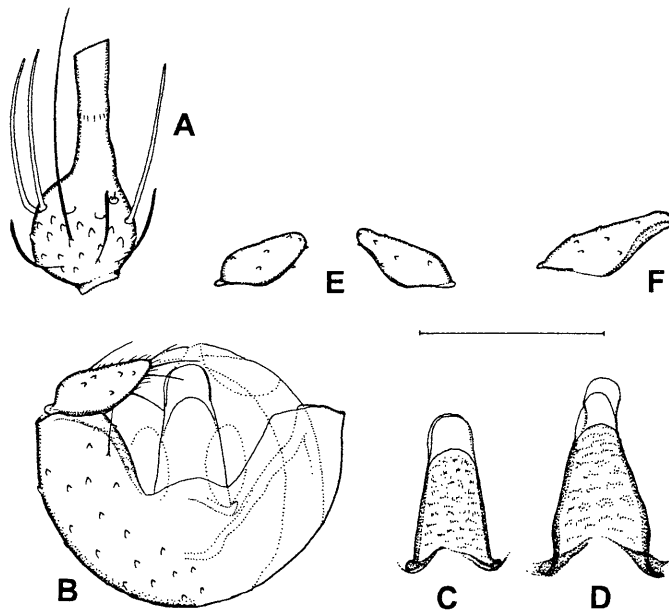
Discussion. Within the *caricis*-group, *pumila* is the only species which has its ventral lobe of the tegmen with the pubescence arranged in groups and rows (irregularly arranged in other species). *Peromyia pumila* is most similar to *autumnalis* in having the tegmen slender (for differences, see under *autumnalis*). There is some variability in the specimens studied, independent of their geographical origin and even within a single series of specimens from one and the same collecting site. Gonostyli vary in length (Figs. 14E compared with 14F), shape (Figs. 14B compared with 14F), and vestiture (i. e., with or without long hairs inside and apically). The shape of tegmen is variable too (cf. Figs. 14C, D).

Distribution and biology. Hk (Ir), Hn (Ao, Ib, Ky, Hy), Ku (Ns, Mz), Ry-Km, Ry-Ow.

Peromyia pumila is one of the most common *Peromyia* species in Japanese forests. Specimens were captured in various forest types, such as deciduous (within or north of the beech zone, or mixed with conifers), evergreen broad-leaved, and mixed deciduous / evergreen broad-leaved, up to 1200 m a. s. l. Once a specimen was taken over rotten oak logs for mushroom cultivation (shiitake). Flight period: Hk: VII; Hn: V, VII-XI; Ku: V, X; Ry: III, V.

Etymology. The name is Latin meaning "diminutive".

Other material studied (55 males). Hk: Ir, Chitose City, 5 km E Lake Shikotsuko, 24 July 1999, leg. Jaschhof, 1 male, no. A0312; Hn: Ao, Shichinohe Town, 28 July 1999,



Figs. 14A-F: *Peromyia pumila* sp. n., male; A: flagellomere 4, lateral view; B: genitalia, ventral view; C, D: tegmen, ventral view; E: gonostyli of the same specimen, ventral view; F: gonostylus, ventral view. A-C: holotype, D, F: same specimen from Honshu, E: paratype. (Length of scale bar: 0.05 mm.)

leg. Jaschhof, 2 males, no. A0466-A0467; Ib, Kitaibaraki City, Sadanami, Ogawa Forest, 9-25 July 1996, leg. Maeto, 1 male, no. A0302; same data, but 6-20 August 1996, 5 males, no. A0303-A0307; same data, but Ogawa Research Forest, 3 May 1999, leg. Jaschhof, 4 males, no. A0308-A0311; Ky, Kyoto City, Fushimi, Momoyama, mid-Oct.-mid-Nov. 1999, leg. Fujita, 3 males, no. A1188-A1190; Hy, Mt. Hyonosen, 28 Sept. 1995, leg. Jaschhof & Yagi, 1 male, no. A0301; Ku: Ns, Sotome Town, 11 Oct. 1999, leg. Jaschhof, 2 males, no. A1191-A1192; Mz, Aya Town, Aya Research Forest, 6 Oct. 1999, leg. Jaschhof, 2 males, no. A1193-A1194; same locality, but 7 Oct. 1999, 1 male, no. A1195; Takachiho Town, 15 Oct. 1999, leg. Jaschhof, 1 male, no. A1196; Lake Miike, 21 May 2000, leg. Jaschhof, 1 male, no. A1197; Ry: Km, Amami Oshima, Kawauchi Village, Kamiya Forest, 26 March 1999, leg. Jaschhof, 3 males, no. A0325-A0327; same data, but 30 March 1999, 6 males, no. A0328-A0333; Amami Oshima, Uken Village, 28 March 1999, leg. Jaschhof, 2 males, no. A0334-A0335; Ow, Iriomote Island, Funaura, Mare River Valley, 6 March 1999, leg. Jaschhof, 1 male, no. A0313; Iriomote, Ohara, 8 March 1999, leg. Jaschhof, 3 males, no. A0314-A0316; Iriomote, Urauchigawa River Valley, 7 March 1999, leg. Jaschhof, 8 males, no. A0317-A0324; Okinawa, Yambaru Peninsula, Mt. Yonahadake, 9 May 2000, leg. Jaschhof, 3 males, no. A1198-A1200; Okinawa, Mt. Nishimedake, 12 May 2000, leg. Jaschhof, 2 males, no. A1201-A1202; same locality, but 13 May 2000, 1 male, no. A1203; Okinawa, Benoki Dam, 13 May 2000, leg. Jaschhof, 1 male, no. A1204, same locality, but 15 May 2000, 1 male, no. A1205.

***Peromyia rhombica* sp. n.**
(Figs. 15A-D)

Male. Body size: 0.6-0.7 mm.

Head: Postfrons non-setose. Eye bridge 1-2 facets long laterally and 2-3 facets at vertex. With 1 row of postocular bristles. Antennae with 12 flagellomeres; terminal flagellomere with sharp constriction resulting in additional small node. Flagellomere 4 (Fig. 15A) with neck longer than node; node with single to double whorl of short scales basally, next to it with double to triple whorl of long setae, medially, just beyond setae, with whorl of long sensory hairs, distally with single sensory spines and fine sensory hairs. Palpi 3-segmented, distal segment variable in length, i. e. longer or shorter than second, proximal 2 segments with sensory hairs.

Thorax: Scutum with sparse lateral and dorsocentral rows of setae. Empodia as long as claws. Claws at least in midlegs with 2 minute teeth. Wings: R1 = 2-2.5 rs, strong anterior portion of C ending at point of intersection with R5 or extending for once the vein width of R5, CuA1+2 with only 2-3 macrotrichia at base.

Abdomen/pattern of tergal plaques: 0 / 2 / 2 / 2 / 1 / 1 / 0 / 0.

Genitalia: Gonocoxites (Fig. 15B) covered with setae and scales ventrally except its membranous central portion, its distal margin with deep emargination extending beyond midlength of gonocoxites. Gonostyli (Figs. 15B, C) rather short, tapered to tip (sometimes almost pointed) in lateral view and flattened and tapered when seen from above resulting in rhombic shape, sparsely setose elsewhere and with long, dense hairs in distal third. Tegmen (Fig. 15D) parallel-sided, with rounded distal margin, without modifications except weak membranous margin distally of the pubescent ventral lobe, the latter covering 4/5 of tegmen length. Tergite 9 short, forming a sclerotized semicircle with medial interruption of sclerotization, with interrupted row of setae along distal margin. Tergite 10 and sternite 10 bilobed, densely pubescent, tergite 10 additionally with a few short setae.

Female. Unknown.

Types. Holotype: male, no. A0382, Japan, Honshu, Shizuoka Pref., Fujinomiya City, Mt. Fuji, in mature, mixed deciduous forest, 1250 m, 6 June 1999, by exhaustor, leg. Jaschhof [in KUEC]. Paratypes: 1 male, no. A0383, same data as holotype; 3 males, no. A0384-A0386, Honshu, Ibaraki Pref., Kukizaki Town, Matsunosato, 13 May 1999, over rotten wood in park, by exhaustor, leg. Jaschhof; 3 males, no. A0387-A0389, Hokkaido, Chitose City, 5 km E Lake Shikotsuko, in mixed deciduous / coniferous forest, 300 m, 24 July 1999, by exhaustor, leg. Jaschhof [no. A0385 and A0389 in KUEC, the others in ZIMG].

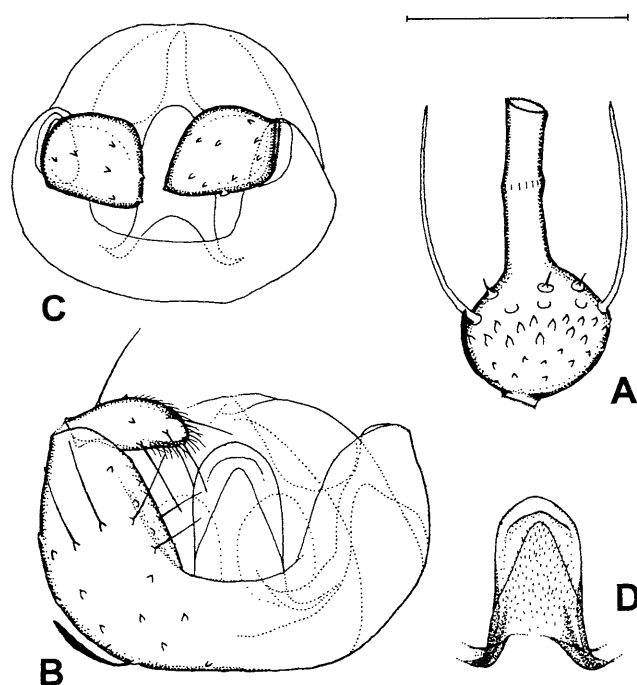
Discussion. Within the *caricis*-group, *rhombica* is characterized by its male genitalia with the gonostyli short and flattened, the gonocoxites very deeply emarginated, and the tegmen widely unmodified and parallel-sided. This combination of characters allows its separation from both the similar *P. aleemkhani* and *boreojaponica* (see above).

Distribution and biology. Hk (So, Ir, Iu), Hn (Ao, Ib, Sz, Os), Sh (Ko), Ku (Fu, Mz), Ry-Ow.

Specimens of *rhombica* were collected in various types of forest, such as subalpine, deciduous (within and north of the beech zone, or mixed with conifers), mixed deciduous / evergreen broad-leaved, and evergreen broad-leaved (sometimes mixed with conifers), up to 1250 m a. s. l. Flight period: Hk: VII; Hn: V-VII, IX; Sh: XI; Ku: V, X; Ry: X.

Etymology. The name refers to the gonostyli that are rhombic if seen from above (in Latin rhombicus = rhombic).

Other material studied (14 males). Hk: So, Rishiri Island, Rishiri Town, 13 July 1999, leg. Jaschhof, 1 male, no. A0393; Iu, Tomakomai City, Hokkaido University Experimental Forest, 30 June-26 July 1999, leg. Jaschhof, 1 male, no. A0394; Hn: Ao,



Figs. 15A-D: *Peromyia rhombica* sp. n., male; A: flagellomere 4, ventrolateral view; B: genitalia, ventral view; C: genitalia, seen from above; D: tegmen, ventral view. A, B, D: holotype, C: paratype from Chitose City. (Length of scale bar: 0.05 mm.)

Shichinohe Town, 28 July 1999, leg. Jaschhof, 1 male, no. A0465; Towadako Town, Tsuta hot spring, 28 July 1999, leg. Jaschhof, 1 male, no. A1182; Ib, Kitaibaraki City, Sadanami, Ogawa Forest, 9-25 July 1996, leg. Maeto, 1 male, no. A0391; Kukizaki Town, Matsunosato, 11 and 25 July 1995, leg. Isono, 3 males, no. A1183-A1185; same locality, but 28 April-7 May 1999, leg. Jaschhof, 1 male, no. A1264; Os, Mino, 29 Sept. 1995, leg. Jaschhof, 1 male, no. A0390; Sh: Ko, Yusuhara Town, Takatoriyama Forest, 5 Nov. 1998, leg. Jaschhof, 1 male, no. A0392; Ku: Fu, Saigawa Town, Mt. Sanda, 1 Oct. 1999, leg. Jaschhof, 1 male, no. A1179; Mz, Aya Town, Aya Research Forest, 6 Oct. 1999, leg. Jaschhof, 1 male, no. A1186; Lake Miike, 21 May 2000, leg. Jaschhof, 1 male, no. A1187.

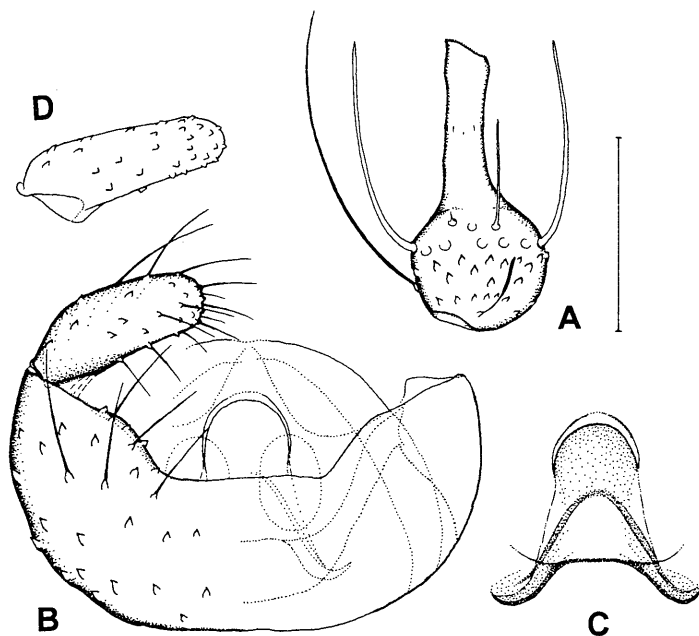
***Peromyia semota* sp. n.**

(Figs. 16A-D)

Male. Body size: 0.8-1.0 mm.

Head: Postfrons non-setose. Eye bridge 1-2 facets long laterally and 2-3 facets at vertex. With 1 row of postocular bristles. Antennal flagellum with 12 flagellomeres; terminal flagellomere constricted resulting in small additional node. Flagellomere 4 (Fig. 16A) with neck longer than node; node with single to double whorl of short setae and scales basally, next to it with double to triple whorl of long setae, medially, just beyond setae, with whorl of long sensory hairs, distally with single short, fine sensory hairs and a few sensory spines. Palpi 4-segmented (exceptionally 3-segmented in a specimen with both 3- and 4-segmented palpi), also second segment with sensory hairs.

Thorax: Scutum with lateral and dorsocentral rows of setae. Empodia as long as claws. Claws of midlegs with very fine teeth. Wings: R1 = 2.5 - 3.5 rs, strong anterior



Figs. 16A-D: *Peromyia semota* sp. n., male; A: flagellomere 4, lateral view; B: genitalia, ventral view; C: tegmen, ventral view; D: gonostylus, ventral view. A-C: holotype, D: specimen from Ibaraki Pref. (Length of scale bar: 0.05 mm.)

portion of C extending point of intersection with R5 for 1(-2) times the vein width of R5.

Abdomen/pattern of tergal plaques: 0 / 2 / 2 / 2 / 1 / 1 / 0 / 0.

Genitalia: Gonocoxites (Fig. 16B) rather wide and short, covered with setae ventrally except its small membranous central portion, its distal margin with wide and shallow emargination extending to less than midlength of gonocoxites, dorsal transverse bridge comparatively wide. Gonostyli (Figs. 16B, D) heavy, elongate, almost parallel-sided but appearing to be little broader proximally when seen from certain angles of view, covered with long setae elsewhere with setation densest in apical third, with 2-3 weak subapical spines dorsally and inside. Tegmen (Fig. 16C) stout, somewhat tapering to tip, with rounded distal margin, without pubescent ventral lobe, with ventral plate a little shorter than tegmen itself and with sclerotized, broad V to U-shaped proximal margin and rounded distal margin having sharp contours. Tergite 9 comparatively long, forming a sclerotized semicircle with medial interruption of sclerotization, with interrupted row (sometimes double row) of setae along distal margin. Tergite 10 bilobed, densely pubescent and with a few short setae. Sternite 10 bilobed, densely pubescent.

Female. Unknown.

Types. Holotype: male, no. A0952, Japan, Honshu, Aomori Pref., Tsuta hot spring, in mature, mixed deciduous forest dominated by beech (*Fagus crenata*), 500-600 m, 25 June-28 July 1999, by Malaise trap, leg. Jaschhof [in KUEC]. Paratypes: 16 males, no. A0953-A0968, same data as holotype [no. A0953-A0954 in KUEC, the others in ZIMG].

Discussion. Among species of the *caricis*-group, *semota* is characterized by elongate, cylindrical gonostyli and its tegmen having a distinct ventral plate and lacking a pubescent lobe. The structure of tegmen is reminiscent of that in *P. fagiphila* and *okochii* (see the proximal margin of ventral plate that is sclerotized, or at least distinct in all these species), but the former has the antennal flagellomeres with two whorls of sensory hairs and the latter has much shorter gonostyli. The shape of gonostyli in *semota* appears to be somewhat variable in that some gonostyli are slenderer than others.

Distribution and biology. Hk (Iu), Hn (Ao, Iw, Ib).

Specimens of *semota* were captured mainly in northern Japanese deciduous forests within or north of the beech zone. Flight period: Hk: VI-VII; Hn: VI-VII.

Etymology. The name is Latin and means "distinct".

Other material studied (4 males). Hk: Iu, Tomakomai City, Hokkaido University Experimental Forest, until 28 June 1998, leg. TOEF, 1 male, no. A0969; same locality, but 30 June-26 July 1999, leg. Jaschhof, 1 male, no. A0970; Hn: Iw, Tamayama Village, Koma, 26 May-15 June 1999, leg. Gotoh, 1 male, no. A0971; Ib, Kitaibaraki City, Sadanami, Ogawa Forest, 9-25 July 1996, leg. Maeto, 1 male, no. A0972.

***Peromyia spinosa* sp. n.**

(Figs. 17A-D)

Male. Body size: 0.8-0.9 mm.

Head: Postfrons non-setose. Eye bridge 1-2 facets long laterally and 2-3 facets at vertex. With 1 row of postocular bristles. Antennae with 12 flagellomeres; terminal flagellomere constricted and with small additional node. Flagellomere 4 (Fig. 17A) with neck shorter than or just as long as node; node with single to triple whorl of short setae basally, next to it with double to triple whorl of long setae, medially /distally with whorl of long sensory hairs, distally with single sensory spines and fine sensory hairs. Palpi 4-segmented (exceptionally 3-segmented by fusion of the both distal segments), segments gradually decreasing in length, with the proximal 3 segments having fairly long sensory hairs.

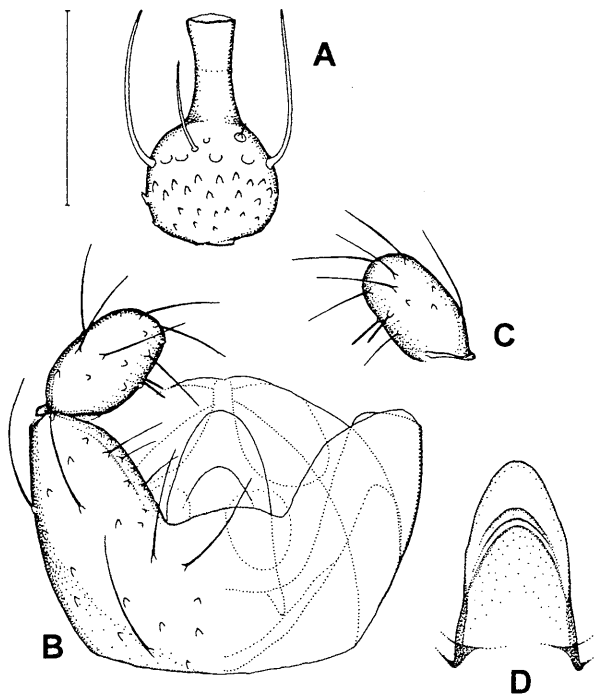
Thorax: Scutum with lateral and dorsocentral rows of setae. Empodia as long as claws. Claws without teeth. Wings: R1 = 2-3 rs, strong anterior portion of C extending beyond point of intersection with R5 for 4-5 times the vein width of R5.

Abdomen/pattern of tergal plaques: 0 / 1 / 1 / 1 / 1 / 1 / 1 / 0 / 0.

Genitalia: Gonocoxites (Fig. 17B) covered with setae and scales ventrally except its membranous central portion, distal margin with emargination extending to approximately midlength of gonocoxites. Gonostyli (Figs. 17B, C) short and stout, parallel-sided, broadly rounded apically, sparsely covered with setae and with 2 spines inside near midlength. Tegmen (Fig. 17D) slightly tapering to tip with rounded apex, in distal half with 2-3 U-shaped membranous margins with one of them better resolved (margin of ventral plate?), with pubescent ventral lobe that is very inconspicuous and sometimes hidden behind the gonocoxites (appears to be absent in holotype specimen). Tergite 9 short, forming a sclerotized semicircle with medial interruption of sclerotization, with interrupted row of setae along distal margin. Tergite 10 and sternite 10 bilobed, densely pubescent.

Female. Unknown.

Types. Holotype: male, no. A0347, Japan, Honshu, Ibaraki Pref., Abukuma Highlands, Kitaibaraki City, Sadanami, Ogawa Forest, in secondary deciduous forest, 600 m, 6-20 Aug. 1996, by Malaise trap, leg. Maeto [in KUEC]. Paratypes: 1 male, no. A0348, Hokkaido, Soya Sub-Pref., Rishiri Island, Rishiri Town, in subalpine forest dominated by fir (*Abies sachalinensis*), 200-300 m, 13 July 1999, by sweepnet, leg. Ja-



Figs. 17A-D: *Peromyia spinosa* sp. n., male; A: flagellomere 4, ventral view; B: genitalia, ventral view; C: gonostylus, dorsal view; D: tegmen, ventral view. A-D: holotype. (Length of scale bar: 0.05 mm.)

schhof; 1 male, no. A0349, Honshu, Ibaraki Pref., Kukizaki Town, Matsunosato, in park-like forest over rotten wood, 13 May 1999, by exhauster, leg. Jaschhof; 1 male, no. A0350, same data as holotype, but 14-27 May 1996; 1 male, no. A0351, Shikoku, Kochi Pref., Tosashimizu City, Ashizuri Peninsula, Satayama Forest Reserve, in mature evergreen broad-leaved forest, 300-400 m, 9 Nov. 1998, by sweepnet, leg. Jaschhof; 1 male, no. A0352, Kagoshima Pref., Amami Oshima, Uken Village, in partly cut evergreen broad-leaved forest, 28 March 1999, by exhauster, leg. Jaschhof [all in ZIMG].

Discussion. Within the *caricis*-group, there is only one species more, *P. monilis* Mam., which has the strong anterior portion of costa as long as *P. spinosa*. *Peromyia monilis* however, not known to occur in Japan, differs strikingly from *spinosa* by the tegmen. Additionally, *spinosa* is characterized by its gonostyli that are short, thick and having two spines inside and by its antennal flagellomeres having the necks shorter than the nodes. The pattern of tergal plaques in this species is unusual.

Distribution and biology. Hk (So), Hn (Ib), Sh (Ko), Ku (Ns, Mz), Ry-Km.

Specimens of *spinosa* were captured in various types of forest, such as subalpine, deciduous, and evergreen broad-leaved, up to 600 m a. s. l. Additional specimens were taken once over rotten oak logs for mushroom cultivation (shiitake). Flight period: Hk: VII; Hn: V; Sh: XI; Ku: X; Ry: III.

Etymology. The name is Latin meaning "thorny", referring to the gonostyli having two spines inside.

Other material studied (12 males). Hn: same data as holotype, but Ogawa Research Forest, 11 May-1 June 1999, leg. Jaschhof, 2 males, no. A1457, A1508; Ib, Mt. Tsukuba, 12 May 1999, leg. Jaschhof, 4 males, no. A1145-A1146; same locality, but 8 May 1999, 3 males, no. A1175-A1177; Ku: Ns, Sotome Town, 11 Oct. 1999, leg. Jaschhof, 1 male, no. A1142; Mz, Takachiho Town, 15 Oct. 1999, leg. Jaschhof, 2 males, no. A1140-A1141.

Peromyia cornuta-group

Species of this group are combined because of a peculiarity in their male genitalia: the ventral plate of tegmen has a strongly sclerotized proximal margin which is joined by an articulation (or a structure that looks like an articulation) with the sclerotized side margins of the tegmen. I consider also *Peromyia ramosa* (Edw.), previously referred to the *modesta*-group (cf. Jaschhof 1998), as belonging here. This peculiar tegmen structure is similarly found in species of the *lobata*-group (see below), the latter founded mainly on the basis of the peculiar gonostylar structure.

All three species referred to the *cornuta*-group are distributed in Japan. One of them is described as new to science.

Peromyia cornuta (Edwards, 1938)

(Figs. 18A, B)

Supplement to description. Male.

Head: Postfrons non-setose. Sometimes with only 1 row of postocular bristles (i. e., the short second row absent).

Thorax/wings: Strong anterior portion of C sometimes extending beyond point of intersection with R5 for 1-2 times the vein width of R5, R1 up to 4 times as long as rs.

Abdomen/pattern of tergal plaques: 0 / 2 / 2 / 2 / 2 / 1 / 0-1 / 0.

Genitalia: Gonostyli with 1-2 short, weak subterminal spines with one of them located dorsally, the other more inside.

Discussion. Japanese specimens of *cornuta* are slightly different from those described from Europe and Russian Far East (cf. Jaschhof 1998: 492 ff.). Almost all Japanese

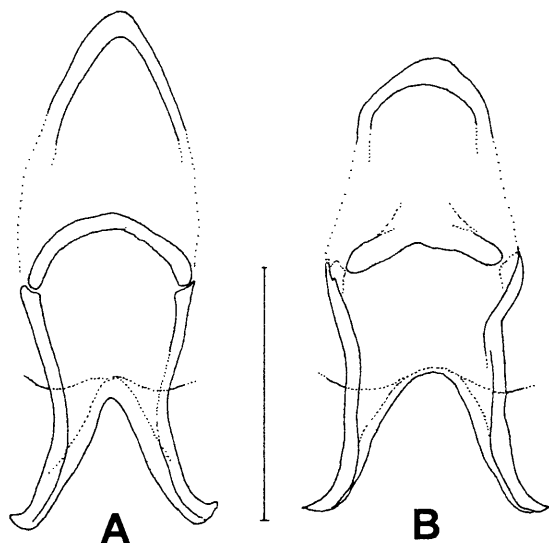
specimens have only one row of postocular bristles, their palpi consist always of four segments and their wing veins, such as C and R1, tend to be a little longer. Additionally, tegmen differs in that the portion below the U-shaped, sclerotized margin of ventral plate tends to be a little longer (Fig. 18A), resulting in that such tegmen look stretched. At the same time one can observe some variation in tegmen structure within the Japanese specimens themselves (Fig. 18B). The latter is true also for the shape of gonostyli. Some gonostyli appear to be rather slender, in other specimens they are somewhat swollen subbasally. As a rule, Japanese specimens compared with European were found to be more variable, for example, in the length of C (i. e., C extending the point of intersection with R5 for zero to two times the vein width of R5), R1 (i. e., R1 being two and a half to four times as long as rs), and in the length of the flagellomeral necks.

There are three specimens from Ogawa Forest, Ibaraki Pref. (no. A0929-A0931), that were collected together with typical *cornuta* specimens but differ from those in having their genitalia with extremely broad tegmen and their antennal flagellomeres with only one distal whorl of sensory hairs. For the time being, I consider them a variety of *P. cornuta*.

Distribution and biology. New record for Japan. Hk (Ir), Hn (Ao, Iw, Ib, Ky), Ku (Mz).

This species was collected in various types of forest mainly between 400 to 700 m a. s. l.: evergreen broad-leaved, mixed deciduous (within and north of the beech zone), and mixed deciduous / coniferous. One specimen originates from a plantation of sugi (*Cryptomeria japonica*) mixed with deciduous trees. Flight period: Hk: VII; Hn: V-XI; Ku: X.

Material studied (39 males). Hk: Ir, Sapporo City, Toyohira, 29 June-26 July 1999, leg. Fukuyama & Jaschhof, 1 male, no. A0924; Hn: Ao, Towadako Town, Tsuta hot spring, 25 June-28 July 1999, leg. Jaschhof, 1 male, no. A0917; Iw, Tamayama Village, Koma, 26 May-15 June 1999, leg. Gotoh, 6 males, no. A0918-A0922, A1097; Ib, Kitaibaraki City, Sadanami, Ogawa Forest, 14-27 May 1996, leg. Maeto, 1 male, no. A0901; same locality, but 27 May-11 June 1996, 1 male, no. A1496; same locality, but



Figs. 18A, B: *Peromyia cornuta* (Edwards, 1938), male; A, B: tegmen, ventral view (0.05 mm). A, B: specimens from Iwate Pref. (In parentheses: length of scale bar.)

9-25 July 1996, 5 males, no. A0125-A0127, A0902-A0903; same locality, but 6-20 Aug. 1996, 13 males, no. A0904-A0916; same data, but Ogawa Research Forest, 3-11 May 1999, leg. Jaschhof, 1 male, no. A1379; same data, but 11 May-1 June 1999, 3 males, no. A1426-A1427, A1506; Mt. Tsukuba, 8 May 1999, leg. Jaschhof, 1 male, no. A1168; Ky, Kyoto City, Kuta Research Forest, 22 Sept.-24 Oct. 1999, leg. Jaschhof, 1 male, no. A0923; Kyoto City, Fushimi, Momoyama, mid. Oct.-mid. Nov. 1999, 1 male, leg. Fujita, 1 male, no. A1167; Ku: Mz, Aya Town, Aya Research Forest, 7 Oct. 1999, leg. Jaschhof, 1 male, no. A0925; same locality, but 5-20 Oct. 1999, 3 males, no. A0926-A0928.

Peromyia gotohi sp. n.

(Figs. 19A-D)

Male. Body size: 0.9-1.0 mm.

Head: Postfrons non-setose. Eye bridge 2-3 facets long laterally and 3-4 facets at vertex. With 1 row of postocular bristles. Antennal flagellum with 12 flagellomeres; terminal flagellomere constricted and with small additional node. Flagellomere 4 (Fig. 19A) with neck little longer than node; node with single to double whorl of short setae basally, next to it with single to double whorl of long setae, distally with 2 whorls of fine, long sensory hairs, some sensory hairs of the lower whorl much longer than the individual flagellomere, whorls sometimes incomplete dorsally, additionally with a few stronger and shorter sensory hairs among the upper whorl and a few sensory spines. Palpi heavy and long, 4-segmented, proximal 3 segments with sensory hairs.

Thorax: Scutum with lateral and dorsocentral rows of setae. Empodia as long as claws. Claws of midlegs with 2-3 fine teeth. Wings: $R_1 = 3.5 rs$, strong anterior portion of C ending at point of intersection with R5.

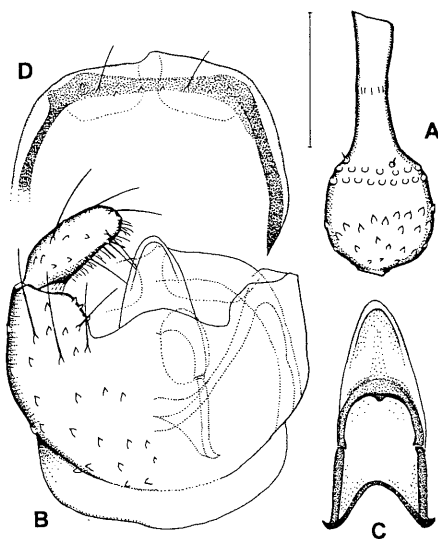
Abdomen/pattern of tergal plaques: 0 / 2 / 2 / 2 / 1 / 1 / 0 / 0.

Genitalia: Gonocoxites (Fig. 19B) covered with setae ventrally except their large membranous central and most proximal portions, its distal margin with wide, shallow emargination, dorsal transverse bridge unusually narrow. Gonostyli (Fig. 19B) elongate, almost cylindrical, rounded distally, covered with long setae, with 2 weak, short spines and fairly long hairs inside. Tegmen (Fig. 19C) elongate, parallel-sided and with sclerotized margins in proximal third, tapering to tip in distal half, with its ventral plate having a horseshoe-shaped, sclerotized proximal margin with small medial knob and a weak distal margin almost extending to tip of tegmen. Tergite 9 (Fig. 19D) short, without medial interruption of sclerotization, with uninterrupted row of fine setae along distal margin. Tergite 10 bilobed, densely pubescent and with few short setae. Sternite 10 bilobed, densely pubescent.

Female. Unknown.

Types. Holotype: male, no. A0932, Japan, Honshu, Iwate Pref., Tamayama Village, Koma, in mixed deciduous forest dominated by oak (*Quercus crispula*), 26 May-15 June 1999, by Malaise trap, leg. Gotoh [in KUEC]. Paratypes: 2 males, no. A0934-A0935, same data as holotype [in ZIMG].

Discussion. *Peromyia gotohi* is the only *Peromyia* species that has the flagellomeres with two distal whorls of long, fine sensory hairs (*P. ogawaensis* has also two distal whorls but with the upper one consisting of strong sensory hairs). Male genitalia in *gotohi* are very similar to those in *P. cornuta*, indicating a close relationship between the two species. Differences are as follows (in parentheses: *cornuta*): gonostyli are cylindrical (slightly tapering to tip), the tegmen has parallel, sclerotized side margins in proximal third (almost V-shaped side margins proximally), and the sclerotization in tergite 9 is not interrupted (sclerotization interrupted medially). One specimen studied (no. A1270) has its genitalia with a (naturally) deformed ventral plate of tegmen.



Figs. 19A-D: *Peromyia gotohi* sp. n., male; A: flagellomere 4, lateral view; B: genitalia, ventral view; C: tegmen, ventral view; D: tergites 9 and 10, dorsal view. A: paratype, B-D: holotype. (Length of scale bar: 0.05 mm.)

Distribution and biology. Hn (Iw, Ib, Sz), Ku (Kt), Ry-Km.

Specimens of *gotohi* were collected in various mixed deciduous, or deciduous / coniferous forests up to 1250 m a. s. l. Flight period: Hn: IV-VI; Ku: IV-V; Ry: III.

Etymology. The species epithet is to honour Dr Tadao Gotoh, forest entomologist at the Forestry and Forest Products Research Institute, Tohoku Branch, Morioka, who supported this study by extensive Malaise trapping in northern Honshu.

Other material studied (19 males). Hn: Ib, Kitaibaraki City, Sadanami, Ogawa Forest, 14-27 May 1996, leg. Maeto, 1 male, no. A0935; same data, but Ogawa Research Forest, 11 May-1 June 1999, leg. Jaschhof, 2 males, no. A1428-A1429; Mt. Tsukuba, 8 May 1999, leg. Jaschhof, 3 males, no. A1169-A1171; same data, but 12-31 May 1999, 1 male, no. A1373; Kukizaki Town, Matsunosato, 21-28 April 1999, leg. Jaschhof, 6 males, no. A1265-A1270; same data, but 28 April-7 May 1999, 1 male, no. A1271; Sz, Fujinomiya City, Mt. Fuji, 6 June 1999, leg. Jaschhof, 1 male, no. A0936; Ku: Kt, Kumamoto City, Tatsudayama Experimental Forest, 21 April-31 May 1999, leg. Ito, 2 males, no. A1115-A1116; Ry: Km, Yaku Island, Kamiyaku Town, Miyanoura, 27 March 1968, leg. Yukawa, 3 males.

Peromyia ramosa (Edwards, 1938)

Supplement to description. Male.

Abdomen/pattern of tergal plaques: 0 / 2 / 2 / 2 / 1 / 1 / 0 / 0.

Distribution and biology. Hn (Ak, Ib, Mi, Ky, Hy, Tt, Hi), Sh (Ko), Ku (Fu, Kt).

Almost all Japanese specimens of *ramosa* were captured in submountainous forests up to 1200 m a. s. l. Among the forests containing this species were mature and young deciduous (mostly dominated by beech, *Fagus crenata*, but sometimes not so) as well as mixed deciduous / coniferous. One specimen was captured in a plantation of sugi (*Cryptomeria japonica*) mixed with deciduous trees. Flight period: Hn: V-VI, VIII-X; Sh: XI; Ku: IV-V, X-XI.

Material studied (29 males). Hn: Ak, Kazuno City, Goshogake Mts., Mt. Yakeyama, 21 June 1999, leg. Jaschhof, 3 males, no. A0477-A0479; Ib, Kitaibaraki City, Sadanami, Ogawa Forest, 14-27 May 1996, leg. Maeto, 5 males, no. A0474-A0476, A1391; same data, but Ogawa Research Forest, 11 May-1 June 1999, leg. Jaschhof, 2 males, no. A1430, A1514; Nn, Kiso Village, Mizukisawa, 16 Aug.-6 Sept. 1999, leg. Jaschhof, 1 male, no. A0891; Hy, Mt. Hyonosen, 28 Sept. 1995, leg. Jaschhof & Yagi, 14 males, no. A0128-A0141; Ky, Kyoto City, Mt. Hiei, 25 Oct. 1995, leg. Jaschhof, 1 male, no. A0142; Sh: Ko, Kochi City, Asakura, 4-11 Nov. 1998, leg. Jaschhof, 1 male, no. A0480; Ku: Fu, Saigawa Town, Mt. Sanda, 1-21 Oct. 1999, leg. Jaschhof, 1 male, no. A0892.

Peromyia curta-group

Species of the *curta*-group are characterized by their flagellomeres having the sensory hairs with short, basal appendices (synapomorphy). This type of sensillae, termed here appendiculate sensory hairs, is unique among all *Peromyia* and even all lestremiine species known. In *Peromyia curta* the presence of appendiculate sensory hairs was previously overlooked (cf. Jaschhof 1997, 1998), because the appendices may be hardly visible in specimens of such small size. As for their male genitalia, species of the *curta*-group correspond fully with those of the *sanguinea*-group, certainly indicating their close relationship.

Six species of this group were found in Japan, five of them are here described as new to science.

Peromyia acutula sp. n.

(Figs. 20A-D)

Male. Body size: 0.7-0.9 mm.

Head: Postfrons non-setose. Eye bridge 1-2 facets long laterally and 2-3 facets at vertex. With 2 rows of postocular bristles. Antennae with 12 flagellomeres; terminal flagellomere constricted and with small additional node. Flagellomere 4 (Fig. 20A) with neck little longer than node; node with single to double whorl of scales basally, next to it with double to triple whorl of long setae, medially, just beyond setae, with whorl of long appendiculate sensory hairs, distally with single sensory spines and fine sensory hairs. Palpi 3-segmented, all segments with sensory hairs (those may lack on third segment).

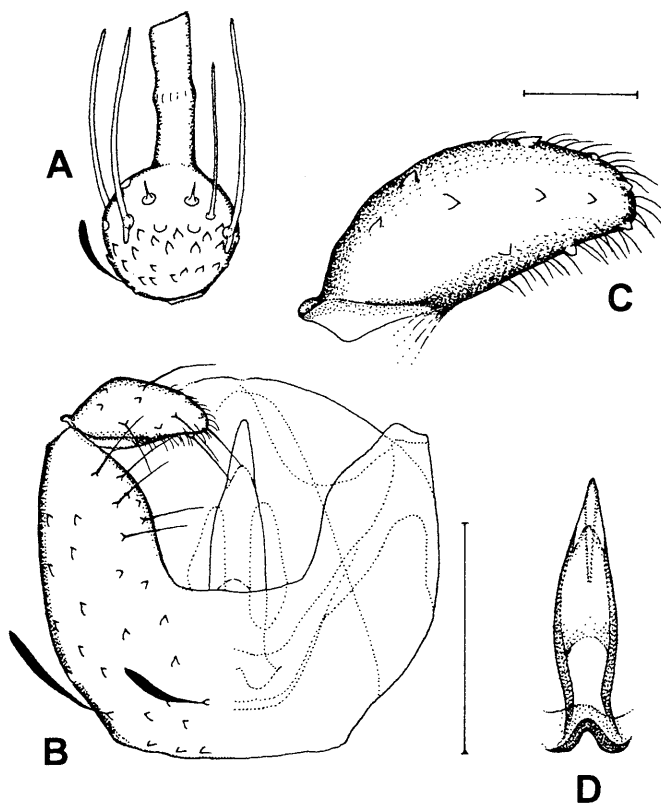
Thorax: Scutum with lateral and dorsocentral rows of setae. Empodia as long as claws. Claws narrow, without teeth. Wings: R1 = 2.5-3 rs, strong anterior portion of C ending at point of intersection with R5.

Abdomen/pattern of tergal plaques: 0 / 2 / 2 / 2 / 1 / 0-1 / 0 / 0.

Genitalia: Gonocoxites (Fig. 20B) covered with setae and broad scales ventrally except its membranous central portion, distal margin with wide emargination extending to midlength of gonocoxites. Gonostyli (Figs. 20B, C) elongate, broadest in proximal third and slightly tapering to tip, with long setae elsewhere and dense hairs distally. Tegmen (Fig. 20D) elongate, narrow, widest at midlength, pointed apically, its lateral margins darker in proximal half, with pale ventral plate covering central portion of tegmen and extending to 4/5 of tegmen length. Tergite 9 long, forming a sclerotized semicircle that is interrupted medially, with interrupted, sparse row of setae along distal margin. Tergite 10 and sternite 10 bilobed each, densely pubescent, tergite 10 additionally with a few weak setae distally.

Female. Unknown.

Types. Holotype: male, no. A1023, Japan, Honshu, Yamanashi Pref., Oyama Town, Mt. Fuji, in subalpine forest of fir (*Abies veitchii*), 2000 m, 17 Aug.-6 Sept. 1999, by



Figs. 20A-D: *Peromyia acutula* sp. n., male; A: flagellomere 4, lateral view (0.05 mm); B: genitalia, ventral view (0.05 mm); C: gonostylus, ventral view (0.01 mm); D: tegmen, ventral view (0.05 mm). A, B, D: holotype, C: specimen from Kyoto Pref. (In parentheses: length of scale bar.)

Malaise trap, leg. Jaschhof [in KUEC]. Paratypes: 1 male, no. A1024, same data as holotype; 2 males, no. A1025-A1026, same locality, but subalpine forest of fir (*Abies veitchii*) and larch (*Larix kaempferi*), 1900 m, 4-13 June 1999 [no. A1026 in KUEC, others in ZIMG].

Discussion. Among species of the *curta*-group, *acutula* is easily distinguished by its male genitalia with the tegmen very narrow and pointed.

Distribution and biology. Hn (Ao, Ib, Yn, Ky).

Specimens of *acutula* were captured in various forest types, such as subalpine, deciduous, and mixed deciduous / coniferous, up to 2000 m a. s. l. Flight period: Hn: VI-X.

Etymology. The name is Latin meaning "somewhat pointed" and refers to the shape of tegmen in this species.

Other material studied (3 males). Hn: Ao, Towadako Town, Tsuta hot spring, 25 June 1999, leg. Jaschhof, 1 male, no. A1027; Ib, Kitaibaraki City, Sadanami, Ogawa Forest, 9-25 July 1996, leg. Maeto, 1 male, no. A1028; Ky, Kyoto City, Kuta Research Forest, 22 Sept.-24 Oct. 1999, leg. Jaschhof, 1 male, no. A1029.

***Peromyia curta* Jaschhof, 1997**
(Figs. 21A-C)

Supplement to description. Male.

Head: Flagellomeres with sensory hairs of appendiculate type (Fig. 21A), nodes sometimes with the proximal half little darker than the distal one, necks sometimes little to clearly longer than nodes.

Thorax/wings: Strong anterior portion of C sometimes ending at point of intersection with R5.

Abdomen/pattern of tergal plaques: 0 / 2 / 2 / 2 / 1 / 1 / 0 / 0.

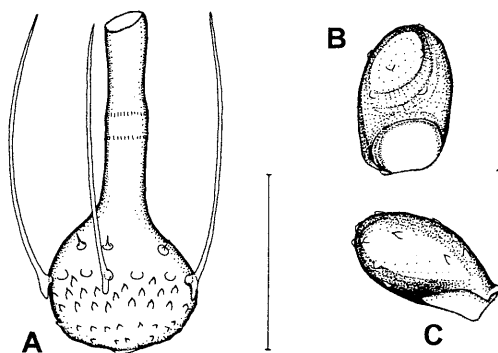
Genitalia: Gonocoxites clearly wider than long, their distal margin with emargination extending usually to less than midlength of gonocoxites. Gonostyli (Figs. 21B, C) slightly flattened, inside a little excavated subbasally, truncate apically.

Discussion. Japanese specimens of *curta* correspond completely with those known from Germany (cf. Jaschhof 1997: 53 f.). Some additional characters are here described in order to allow more confidently distinguishing it from very similar species (such as *simpla*, and *subcurta*, see below). Some *curta* specimens from Shikoku (no. A0400-A0404) differ slightly from others by their robust overall appearance, having their gonostyli clearly flattened, and their tegmen with fairly short but distinct ventral plate. As for the appendiculate sensillae in *curta*, the length of the appendices was proven to be variable. In some specimens studied appendices were hardly resolved even by using 1000 times magnification.

Distribution and biology. Hk (So, Ir), Hn (Ak, Iw, Ib, Nn, Yn, Sz, Ky, Os, Hy, Hi), Sh (Ko), Ku (Fu, Kt, Mz).

Peromyia curta is one of the most common *Peromyia* species in the forests of mainland Japan. It was captured in all the main types of forest, such as subalpine, deciduous (within, south and north of the beech line), and evergreen broad-leaved, in elevations up to 2200 m. Some specimens originate from a plantation of sugi (*Cryptomeria japonica*) mixed with deciduous trees. Flight period: Hk: VII-VIII; Hn: IV-IX(-X?); Sh: VI, XI; Ku: V, X.

Material studied (57 males). Hk: So, Rishiri Island, Rishiri Town, 13 July 1999, leg. Jaschhof, 3 males, no. A0408-A0410; Ir, Chitose City, 5 km E Lake Shikotsuko, 24 July 1999, leg. Jaschhof, 1 male, no. A0411; same data, but 26 July 1999, 1 male, no. A0412; Sapporo City, Toyohira, 26 July-16 Aug. 1999, leg. Fukuyama & Jaschhof, 1



Figs. 21A-C: *Peromyia curta* Jaschhof, 1997, male; A: flagellomere 4, ventral view (0.05 mm). B: gonostylus, seen from inside (0.02 mm); C: dito, ventral view (0.02 mm). A: specimen from Shikoku, B, C: same specimen from Honshu. (In parentheses: length of scale bar.)

male, no. A0991; Hn: Iw, Tamayama Village, Koma, 26 May-15 June 1999, leg. Gotoh, 1 male, no. A0992; Ak, Kazuno City, Goshogake Mts., Mt. Yakeyama, 21 June 1999, leg. Jaschhof, 2 males, no. A0469-A0470; Ib, Kitaibaraki City, Sadanami, Ogawa Forest, 9-25 July 1996, leg. Maeto, 3 males, no. A0176-A0178; same locality, but 14-27 May 1996, 3 males, no. A1402-A1403, A1474; same data, but Ogawa Research Forest, 3-11 May 1999, leg. Jaschhof, 3 males, no. A1404-A1406; same data, but 11 May-1 June 1999, 2 males, no. A1472-A1473; Kukizaki Town, Matsunosato, 25 April 1995, leg. Isono, 1 male, no. A0995; Nn, Mitake Village, Mt. Ontake, 16 Aug.-7 Sept. 1999, leg. Jaschhof, 2 males, no. A0993-A0994; Azumi Village, Norikurakogen, 14 July 2000, leg. Jaschhof, 2 males, no. A1407-A1408; Yn, Oyama Town, Mt. Fuji, 4-13 June 1999, leg. Jaschhof, 6 males, no. A0996-A1001; same locality, but 17 Aug.-6 Sept. 1999, 3 males, no. A1010-A1012; Sz, Fujinomiya City, Mt. Fuji, 6 June 1999, leg. Jaschhof, 2 males, no. A0406-A0407; Ky, Kyoto City, Kuta Research Forest, 22 Sept.-24 Oct. 1999, leg. Jaschhof, 1 male, no. A1002; Os, Mino, 29 Sept. 1995, leg. Jaschhof, 1 male, no. A0168; Hy, Mt. Hyonosen, 28 Sept. 1995, leg. Jaschhof & Yagi, 6 males, no. A0162-A0167; Hi, Yoshiwa Village, Miminoki Forest Park, 29 Sept. 1999, leg. Jaschhof, 1 male, no. 1003; Sh: Ko, Yusuhara Town, Takatoriama Forest, 5 Nov. and 5-19 Nov. 1998, leg. Jaschhof, 5 males, no. A0400-A0404; same locality, but 1-16 June 2000, leg. Maeto, 1 male, no. A1487; Ko, Tosashimizu City, Satayama Forest, 9 Nov. 1998, leg. Jaschhof, 1 male, no. A0405; Ku: Fu, Mt. Tachibana, 25 May 2000, leg. Jaschhof, 1 male, no. A1098; Kt, Mt. Aso, 12 and 14 Oct. 1995, leg. Jaschhof, 7 males, no. A0169-A0175; Mz, Aya Town, Aya Research Forest, 5-20 Oct. 1999, leg. Jaschhof, 1 male, no. A1004.

***Peromyia gemella* sp. n.**

(Figs. 22A-E)

Male. Body size: 0.9-1.1 mm.

Head: Postfrons non-setose. Eye bridge 3-4 facets long. With 2 rows of postocular bristles, posterior row usually much shorter than anterior. Antennae with 12 flagellomeres; terminal flagellomere constricted and with small additional node. Flagellomere 4 (Fig. 22A) with neck longer than node; node sometimes wider than long, sometimes with its proximal half darker than the distal one, with single to double whorl of setae basally (in the 2 proximal flagellomeres with scales instead), next to it with double to triple whorl of long setae, medially, just beyond setae, with whorl of long appendiculate sensory hairs, distally with single sensory spines and fine sensory hairs. Palpi 3-segmented, terminal segment variable in length, i. e. shorter or longer than second.

Thorax: Scutum with wide lateral and dorsocentral rows of setae and scales. Empodia as long as claws. Claws without teeth. Wings: R1 = 1.5-2.5 rs, strong anterior portion of C extending beyond point of intersection with R5 for 0-2 times the vein width of R5.

Abdomen/pattern of tergal plaques: 0 / 2 / 2 / 2 / 2 / 1 / 0 / 0.

Genitalia: Gonocoxites (Fig. 22B) covered with setae and broad scales ventrally except its membranous central portion, its distal margin with wide emargination extending to less than midlength of gonocoxites. Gonostyli (Figs. 22B, C) elongate, parallel-sided when seen from more above (cf. Fig. 22B, gonostyli slightly distorted) but little broader proximally in lateral view (Fig. 22C), with fairly sparse setation and dense, long hairs distally. Tegmen (Figs. 22D, E) elongate, slender, almost parallel-sided, with pale ventral plate covering central portion of tegmen and extending to 4/5 of the length of tegmen, ventral plate with weakly sclerotized, horseshoe-shaped proximal margin, a little pointed or rounded at tip. Tergite 9 very short, forming a sclerotized semicircle with wide medial interruption of sclerotization, with interrupted, sparse row of setae along distal margin.

Tergite 10 and sternite 10 bilobed each, densely pubescent; tergite 10 additionally with a few long setae distally.

Female. Unknown.

Types. Holotype: male, no. A0395, Japan, Kagoshima Pref., Amami Oshima, Kawauchi Village, Kamiya Forest, in mature, evergreen broad-leaved forest, 30 March 1999, by exhaustor, leg. Jaschhof [in KUEC]. Paratypes: 4 males, no. A0396-A0399, same data as holotype [all in ZIMG].

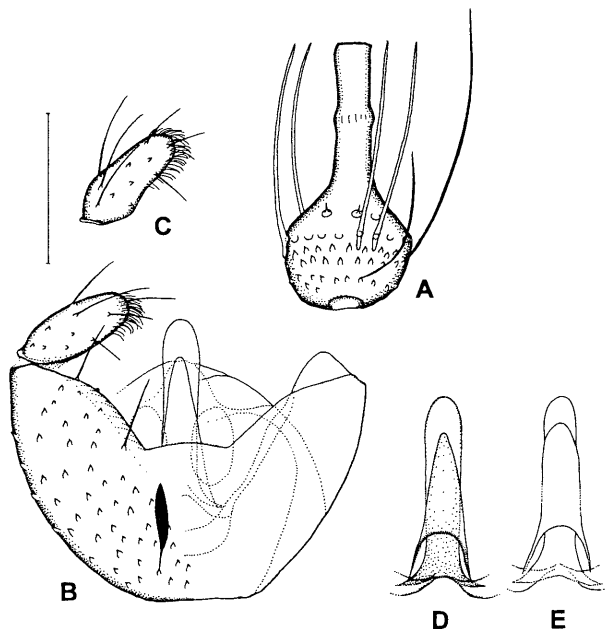
Discussion. Male genitalia in *gemella* are extremely similar to those in *P. pilosa* (*sanguinea*-group, see below), but gonocoxites in *pilosa* have their ventral emargination extending beyond midlength of gonocoxites and its tegmen has the ventral plate longer and paler. Among species of the *curta*-group, *gemella* is distinguished by the combination of almost cylindrical gonostyli having long hairs distally and the tegmen with comparatively distinct ventral plate.

Distribution and biology. Hk (Ir), Hn (Ao, Ak, Iw, Ib), Sh (Ko), Ku (Mz), Ry-Km, Ry-Ow.

Specimens of *gemella* were captured in both evergreen broad-leaved and deciduous (within and north of the beech zone) forests up to 1000 m a. s. l. Flight period: Hk: VII-VIII; Hn: V-VII; Sh: VI; Ku: V; Ry: III, V.

Etymology. The name is Latin meaning "twin-born" and refers to that *gemella* is almost identical with another *Peromyia* species, *pilosa*.

Other material studied (27 males). Hk: Ir, Sapporo City, Toyohira, 29 June-26 July 1999, leg. Fukuyama & Jaschhof, 1 male, no. A0980; same locality, but 26 July-16 Aug. 1999, 2 males, no. A0981-A0982; Hn: Ao, Towadako Town, Tsuta hot spring, 25 June-28 July 1999, leg. Jaschhof, 2 males, no. A0983-A0984; Ak, Kazuno City,



Figs. 22A-E: *Peromyia gemella* sp. n., male; A: flagellomere 4, dorsolateral view; B: genitalia, ventral view; C: gonostylus, ventral view; D, E: tegmen, ventral view. A, B, D: holotype, C, E: paratypes. (Length of scale bar: 0.05 mm.)

Goshogake Mts., Mt. Yaakeyama, 21 June 1999, leg. Jaschhof, 1 male, no. A0468; Iw, Tamayama Village, Koma, 26 May-15 June 1999, leg. Gotoh, 1 male, no. A0985; Ashiro Town, Appi Highland, Mt. Appidake, 19 June-29 July 1999, leg. Jaschhof, 6 males, no. A1107-A1112; Ib, Kitaibaraki City, Sadanami, Ogawa Research Forest, 11 May-1 June 1999, leg. Jaschhof, 8 males, no. A1469-A1471, A1509-A1513; Sh: Ko, Yusuvara Town, Takatoriya Forest Reserve, 1-16 June 2000, leg. Maeto, 1 male, no. A1486; Ku: Mz, Lake Miike, 21 May 2000, leg. Jaschhof, 4 males, no. A0986-A0989; Ry-Ow, Okinawa, Yambaru Peninsula, Benoki Dam, 6-18 May 2000, leg. Jaschhof, 1 male, no. A0990.

Peromyia simpla sp. n.

(Figs. 23A-D)

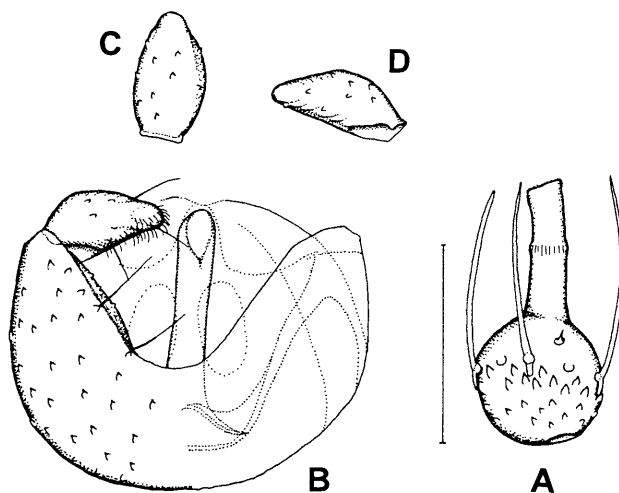
Male. Body size: 0.7-0.8 mm.

Head: Postfrons non-setose. Eye bridge 1-2 facets long laterally and 2-3 facets at vertex. With 1 row of postocular bristles and a few bristles forming an irregular posterior row. Antennae with 12 flagellomeres; terminal flagellomere constricted resulting in ovoid additional node. Flagellomere 4 (Fig. 23A) with neck as long as or a little longer than node; node with irregular double to triple whorl of short setae basally, next to it with double to triple whorl of long setae, medially, just beyond setae, with whorl of long appendiculate sensory hairs, distally with single sensory spines. Palpi 3-segmented, also second segment with a few sensory hairs.

Thorax: Scutum with lateral and dorsocentral rows of setae. Empodia as long as claws. Claws slender, without teeth. Wings: R1 = 1.5-2 rs, strong anterior portion of C ending at point of intersection with R5.

Abdomen/pattern of tergal plaques: 0/2/2/2/0/0/0/0.

Genitalia: Gonocoxites (Fig. 23B) covered with setae ventrally except its membranous central portion, its distal margin with emargination extending to midlength of gonocoxites. Gonostyli (Figs. 23B-D) short, a little flattened, tapering to tip, with fairly sparse setation and dense hairs distally and inside. Tegmen (Fig. 23B) long and narrow,



Figs. 23A-D: *Peromyia simpla* sp. n., male; A: flagellomere 4, ventrolateral view; B: genitalia, ventral view; C: gonostylus, seen from above; D: gonostylus, ventral view. A, B: holotype, C, D: same paratype. (Length of scale bar: 0.05 mm.)

parallel-sided, rounded distally, completely membranous, without ventral plate or other modifications. Tergite 9 comparatively long, forming a sclerotized semicircle with wide medial interruption of sclerotization, with interrupted row of setae along distal margin. Tergite 10 and sternite 10 bilobed each, densely pubescent; tergite 10 additionally with a few setae distally.

Female. Unknown.

Types. Holotype: male, no. A1005, Japan, Honshu, Ibaraki Pref., Kitaibaraki City, Sadanami, Ogawa Forest, in secondary deciduous forest, 600 m, 6-20 Aug. 1996, by Malaise trap, leg. Maeto [in KUEC]. Paratypes: 1 male, no. A1006, same data as holotype, 2 males, no. A1007-A1008, same data, but 9-25 July 1996; 1 male, no. A1518, same data, but Ogawa Research Forest, 11 May-1 June 1999, by Malaise trap, leg. Jaschhof [all in ZIMG].

Discussion. Within the *curta*-group, *simpla* is most similar to *curta* and *subcurta* (for differences between them, see under *subcurta*). The pattern of tergal plaques in *simpla* is exceptional but was found to be stable within the specimens studied. *Peromyia simpla* is one of the smallest lestremiines of all.

Distribution and biology. Hn (Ib).

For details of the habitat, see under types. Flight period: Hn: V, VII-VIII.

Etymology. The name is Latin meaning "simple" and refers to the widely unmodified male genitalia in this species.

***Peromyia subcurta* sp. n.**

(Figs. 24A-C)

Male. Body size: 0.7-0.8 mm.

Head: Postfrons non-setose. Eye bridge 1-2 facets long laterally and 2-3 facets at vertex. With 1 row of postocular bristles and a few bristles forming a irregular posterior row. Antennae with 12 flagellomeres; terminal flagellomere constricted and with small additional node. Flagellomere 4 (Fig. 24A) with neck as long as or little longer than node; node with single to double whorl of scales basally, next to it with double to triple whorl of long setae, medially, just beyond setae, with whorl of long appendiculate sensory hairs, distally with a few sensory spines. Palpi 3-segmented, all segments with a few long sensory hairs that are occasionally absent on segment 3.

Thorax: Scutum with sparse lateral and dorsocentral rows of setae. Empodia as long as claws. Claws slender, without teeth. Wings: R1 = 2.5-3 rs, strong anterior portion of C ending at point of intersection with R5.

Abdomen/pattern of tergal plaques: 0 / 2 / 2 / 2 / 0-1 / 0-1 / 0 / 0.

Genitalia: Gonocoxites (Fig. 24B) comparatively long, covered with setae and scales ventrally except its membranous central portion, distal margin with emargination extending to or beyond midlength of gonocoxites. Gonostyli (Fig. 24B) short, tapering to tip, with fairly sparse, long setation. Tegmen (Fig. 24B) long and narrow, parallel-sided, rounded distally, with pale ventral plate with its proximal margin sometimes visible but usually not so. Tergite 9 comparatively long, forming a sclerotized semicircle with medial interruption of sclerotization, with interrupted row of setae along distal margin. Tergite 10 bilobed, densely pubescent and with a few setae distally. Sternite 10 very large, bilobed, densely pubescent.

Female. Unknown.

Types. Holotype: male, no. A1013, Japan, Honshu, Kyoto Pref., Kyoto City, Kuta Research Forest, in mature, mixed deciduous / coniferous forest, 500-700 m, 22 Sept.-24 Oct. 1999, by Malaise trap, leg. Jaschhof [in KUEC]. Paratypes: 4 males, no. A1014-A1017, same data as holotype [no. A1017 in KUEC, the others in ZIMG].

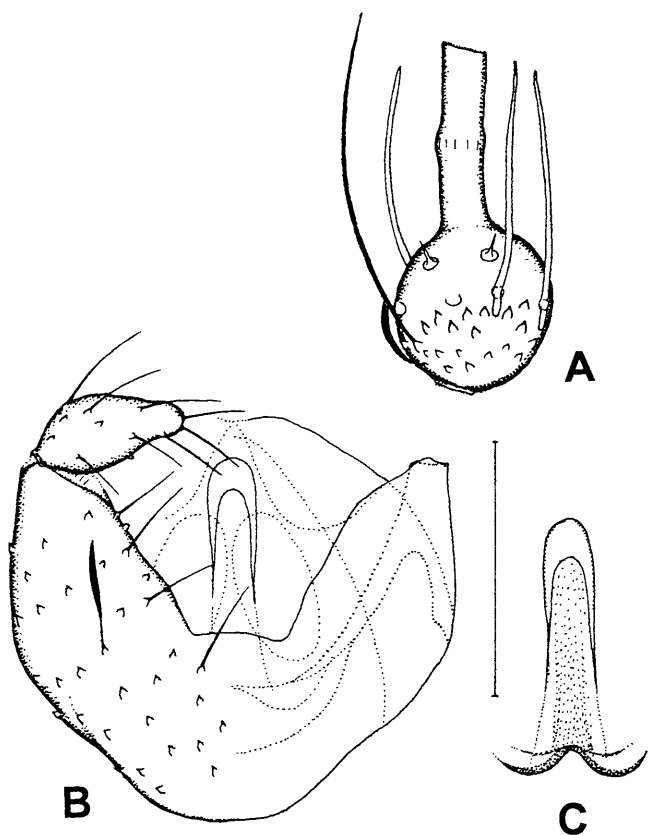
Discussion. Within the *curta*-group, *subcurta* is most similar to *curta* and *simpla*. Compared with *curta* (in parentheses), the tegmen in *subcurta* is longer, gonocoxites are longer and have its emargination deeper ventrally, and gonostyli are tapering to tip (almost parallel-sided and truncate apically). *Peromyia subcurta* is distinguished from *simpla* (in parentheses) in that its tegmen has the ventral plate present (ventral plate absent), gonostyli lack a dense cover of hairs (with dense hairs apically and inside), and sternite 10 is larger. Differences between *curta*, *simpla* and *subcurta* are indeed small but were found to be stable within the many specimens studied.

Distribution and biology. Hn (Ao, Ib, Ky, Hi), Ku (Mz).

Specimens of *subcurta* were captured in evergreen broad-leaved and deciduous (with and without beech, or mixed with conifers) forests up to 800 m a. s. l. Another specimen was collected over oak logs for mushroom cultivation (shiitake). Flight period: Hn: V, VII-X; Ku: X.

Etymology. The name refers to the fact that the new species is very close to *Peromyia curta*.

Other material studied (9 males). Hn: Ao, Towadako Town, Tsuta hot spring, 25 June-28 July 1999, leg. Jaschhof, 1 male, no. A1018; Ib, Kitaibaraki City, Sadanami, Ogawa Forest, 6-20 Aug. 1996, leg. Maeto, 1 male, no. A1019; same data, but Ogawa



Figs. 24A-C: *Peromyia subcurta* sp. n., male; A: flagellomere 4, lateral view; B: genitalia, ventral view; C: tegmen, ventral view. A: paratype, B, C: holotype. (Length of scale bar: 0.05 mm.)

Research Forest, 3-11 May 1999, leg. Jaschhof, 3 males, no. A1384-A1386; same data, but 11 May-1 June 1999, 1 male, no. A1468; Hi, Yoshiwa Village, Miminoki Forest Park, 29 Sept. 1999, leg. Jaschhof, 1 male, no. A1020; Ku: Mz, Aya Town, Aya Research Forest, 6 Oct. 1999, 1 male, leg. Jaschhof, no. A1021; Mz, Morotsuka Village, 16 Oct. 1999, leg. Jaschhof, 1 male, no. A1022.

***Peromyia tenella* sp. n.**

(Figs. 25A-D)

Male. Body size: 0.7-0.9 mm.

Head: Postfrons non-setose. Eye bridge 1-2 facets long laterally and 2-3 facets at vertex. With 2 rows of postocular bristles. Antennae with 12 flagellomeres; terminal flagellomere strongly constricted resulting in ovoid additional node. Flagellomere 4 (Fig. 25A) with neck longer than node; node with single to triple whorl of scales basally, next to it with double to triple whorl of long setae, medially, just beyond setae, with whorl of long appendiculate sensory hairs having the appendices very long, distally with a few sensory spines and single fine sensory hairs. Palpi 3 to 4-segmented, at least the 2 proximal segments with sensory hairs.

Thorax: Scutum with lateral and dorsocentral rows of setae. Empodia a little shorter than claws. Claws slender, without teeth. Wings: $R_1 = 2.5-3$ rs, strong anterior portion of C extending point of intersection with R_5 for 0-1 time the vein width of R_5 .

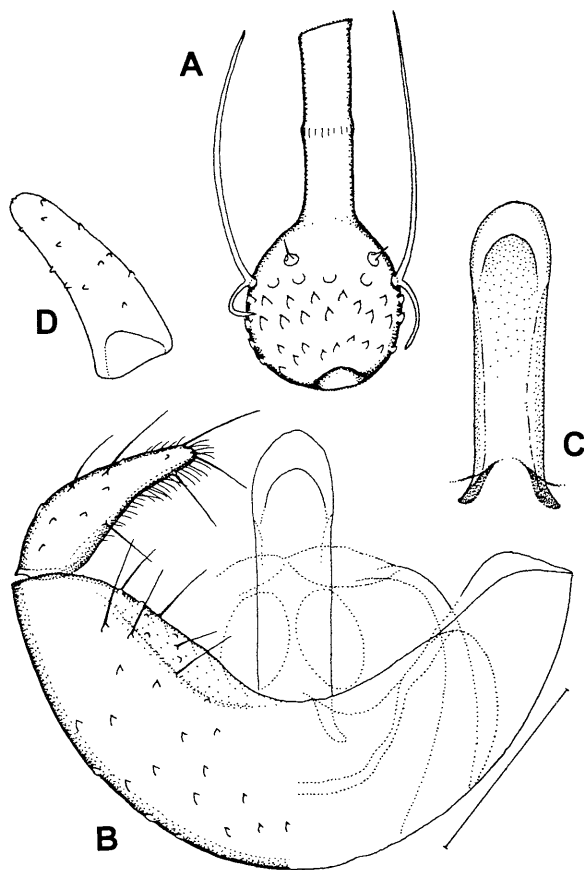
Abdomen/pattern of tergal plaques: 0 / 1 / 1 / 1 / 1 / 1 / 0 / 0.

Genitalia: Gonocoxites (Fig. 25B) usually straddled resulting in wide, shallow emargination of its distal margin, covered with setae ventrally except its membranous central portion. Gonostyli (Figs. 25B, D) elongate, very slender and tapering to tip in lateral view, flattened and thus looking broader when seen from above, sometimes appearing a little curved inwards, with fairly sparse, long setation, in apical third or fourth with long hairs. Tegmen (Fig. 25C) long and narrow, parallel-sided, rounded distally, with usually pale, indistinct ventral plate which is visible mainly by its distal margin. Tergite 9 short, forming a sclerotized semicircle that is interrupted medially, somewhat rectangular distolaterally, with interrupted row of setae along distal margin. Tergite 10 small, sometimes extending well beyond distal margin of tergite 9, bilobed, densely pubescent and with a very few setae distally. Sternite 10 bilobed, densely pubescent.

Female. Unknown.

Types. Holotype: male, no. A1499, Japan, Honshu, Ibaraki Pref., Kitaibaraki City, Sadanami, Ogawa Forest, in plantation of sugi (*Cryptomeria japonica*) mixed with deciduous trees, 600, 27 May-11 June 1996, by Malaise trap, leg. Maeto [in KUEC]. Paratypes: 1 male, no. A1500, same locality, but Ogawa Research Forest, in mature, mixed deciduous forest dominated by beech (*Fagus crenata*), 3 May 1999, by exhaustor, leg. Jaschhof; 1 male, no. A1501, same locality, but 3-11 May 1999, by Malaise trap, leg. Jaschhof; 1 male, no. A1517, same locality, but 11 May-1 June 1999; 1 male, no. A1502, same locality as holotype, but in secondary deciduous forest, 6-20 Aug. 1996, leg. Maeto [all in ZIMG].

Discussion. Among species of the *curta*-group, this new species is characterized by its male genitalia having the gonostyli very long and extremely slender. Most specimens are conspicuous, even under stereo-microscope, in that their gonocoxites are widely straddled. Antennal flagellomeres have their appendiculate sensory hairs with very long appendices, i. e. the longest in any species found so far. There are several additional specimens in my collection that differ slightly from those described above in one or more characters and this gives reason to not include them here. These differences concern gonostyli (that are sometimes longer than those described above or clearly curved),



Figs. 25A-D: *Peromyia tenella* sp. n., male; A: flagellomere 4, lateral view; B: genitalia, ventral view; C: tegmen, ventral view; D: gonostylus, seen from inside. A-C: holotype, D: paratype from Ibaraki Pref. (Length of scale bar: 0.05 mm.)

tegmen (having its ventral plate more distinct even proximally), and flagellomeres (with the appendices of sensory hairs short or almost lacking). Given that not many specimens of *tenella* are so far known, I am still in doubt whether those differences come under infraspecific variability or indicate the presence of additional species. The pattern of tergal plaques in *tenella* has to be considered exceptional.

Distribution and biology. Hn (Ib).

Specimens of this new species were captured in a mixed deciduous forests dominated by beech (*Fagus crenata*) at 600 m a. s. l. Another specimen was collected in a nearby plantation of sugi (*Cryptomeria japonica*) mixed with deciduous trees. Flight period: Hn: V-VI, VIII.

Etymology. The name is a Latin adjective meaning "delicate".

***Peromyia intermedia*-group**

Species of the *intermedia*-group have their male genitalia with the gonostyli lobed inside. This gonostylar lobe may be striking and nose-like, or inconspicuous and wart-like. Lobed gonostyli are combined with elongate, almost completely membranous

tegmen having a weak ventral plate. Additionally, tergite 10 and sternite 10 are largely or completely reduced. Species included here are among the smallest *Peromyia* known.

Five of six or seven species belonging to the *intermedia*-group were found to occur in Japan. Three species are here described as new to science. All species referred to this group are morphologically largely identical except for details in their male genitalia, in particular, gonostyli and tegmen. Evaluation of morphological characters is extremely hard in these species because of their minute body size and soft, or membranous constitution of the structures that are thought to provide taxonomic characters. There are several specimens in my collection that I cannot refer to any of the species treated here, because their suite of characters is intermediate in between various species rather than diagnostic. At present, material is too poor in order to decide whether those specimens indicate greater infraspecific variability in known species or the existence of two or three additional species.

Peromyia anatina Mamaev et Berest, 1990
(Figs. 26A, B)

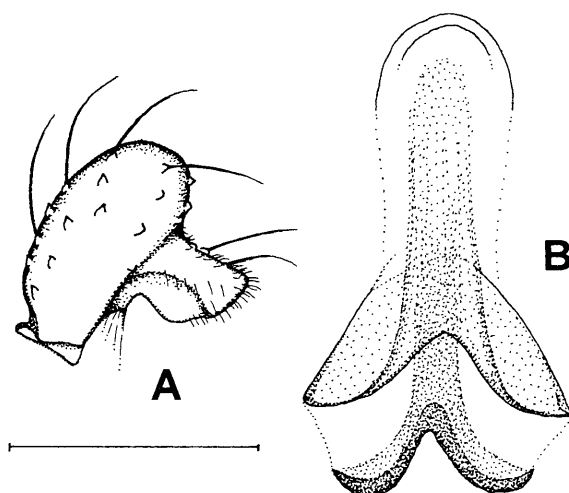
Supplement to description. Male.

Head: Postfrons non-setose.

Thorax: Claws of midlegs (sometimes?) with 2 minute teeth. Wings: strong anterior portion of C extending beyond point of intersection with R5 for 1-2 times the vein width of R5, R1 = up to 3.5 rs.

Genitalia: In most Japanese specimens, ventral plate of tegmen (Fig. 26B) with broad, rounded, weakly sclerotized shield (ventrally?). Tergite 10 very narrow and inconspicuous, bare except 2-3 fine setae.

Discussion. Japanese specimens of *Peromyia anatina* correspond widely with that redescribed by Jaschhof (1998: 456ff.) on the basis of German specimens. The structure of tegmen however is slightly different: in Japanese specimens ventral plate has a broad, weakly sclerotized shield proximally that is not present in previously known material.



Figs. 26A, B: *Peromyia anatina* Mam. & Ber., male; A: gonostylus, ventral view; B: tegmen, ventral view. A, B: specimen from Shizuoka Pref. (Length of scale bar: 0.05 mm.)

This difference is small and hard to evaluate because the three-dimensional structure of tegmen, including its ventral plate, is poorly understood. A shield very similar to that described here is present in *P. centrosa* too (see below) and there it is visible in only one of the six specimens studied. One of the *anatina* specimens studied (no. A1411) lacks the shield, but differs slightly in that its costa extends the point of intersection with R5 for just once the vein width of R5. Males in *Peromyia anatina* were redescribed (Jaschhof l. c.) to lack tergite 10. Actually, tergite 10 is present in this species but very weak and inconspicuous.

Mamaev (1998d: 5) stated that the redescription given for *anatina* (Jaschhof l. c.) did not fit *anatina* but *P. subanatina* Mam. & Zaitz. In the original description Mamaev & Zaitzev pointed out that male genitalia in *subanatina* have the tergite 9 with a "median triangular lobe", without explaining whether this character might be useful or not in distinguishing between *subanatina* and the extremely similar *anatina*. The lobe mentioned by these authors is certainly identical with tergite 10 that sometimes extends beyond the distal margin of tergite 9, in this as well as other species. On the basis of the descriptions alone I am not able to distinguish between the two species and do not preclude their identity.

Distribution and biology. New record for Japan. Hk (Ir), Hn (Iw, Nn, Sz).

Specimens of *anatina* were collected in mixed deciduous and deciduous / coniferous forests, situated in both lowland Hokkaido and mountainous Honshu between 1000 and 1550 m a. s. l. Flight period: Hk: VIII-IX; Hn: VI-VII.

Material studied (8 males). Hk: Ir, Sapporo City, Toyohira, 16 Aug.-13 Sept. 1999, leg. Fukuyama & Jaschhof, 1 male, no. A1035; Hn: Iw, Ashiro Town, Appi Highland, Mt. Appidake, 19 June-29 July 1999, leg. Jaschhof, 1 male, no. A1360; Nn, Azumi Village, Norikurakogen, 14 July 2000, leg. Jaschhof, 1 male, no. A1411; Sz, Fujinomiya City, Mt. Fuji, 6 June 1999, leg. Jaschhof, 5 males, no. A0512-A0516.

Peromyia carinata sp. n.

(Figs. 27A-H)

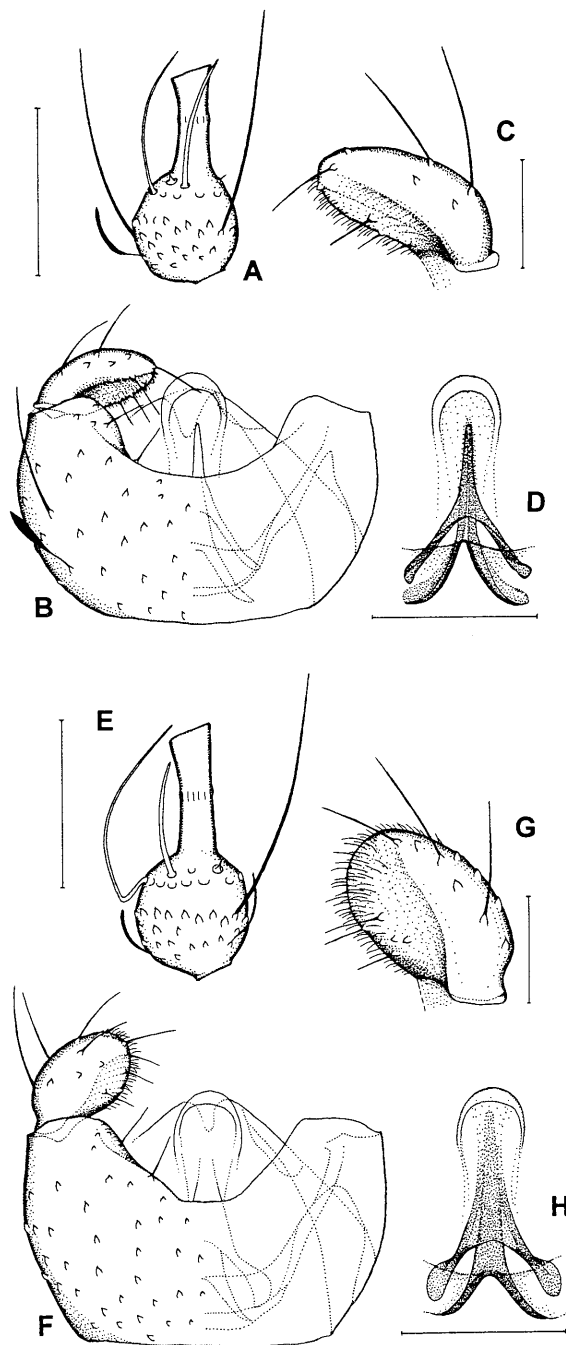
Male. Body size: 0.8-0.9 mm.

Head: Postfrons non-setose. Eye bridge 1-2 facets long laterally and 2-3 facets at vertex. With 1 row of postocular bristles. Antennae with 12 flagellomeres; terminal flagellomere a little constricted. Flagellomere 4 (Figs. 27A, E) with neck little longer than node; node with single to double whorl of short scales basally that is sometimes incomplete dorsally, next to it with single to triple whorl of long setae, distally with whorl of fine, long sensory hairs, additionally with a few stronger, long sensory hairs and sensory spines. Palpi 3 to 4-segmented.

Thorax: Scutum with lateral and dorsocentral rows of setae. Empodia as long as claws. Claws of midlegs with 2 minute teeth. Wings: R1 = 2.5-3 rs, strong anterior portion of C extending beyond point of intersection with R5 for 1-2 times the vein width of R5.

Abdomen/pattern of tergal plaques: 0 / 2 / 2 / 2 / 1 / 0-1 / 0 / 0.

Genitalia: Gonocoxites (Figs. 27B, F) covered with long setae and scales ventrally, its distal margin with wide U-shaped emargination extending to less than midlength of gonocoxites. Gonostyli (Figs. 27B, C, F, G) usually somewhat elongate but shorter and thicker in parts of the material studied, sometimes appearing to be slightly curved inwards and a little tapered to tip, inside with weak, keel-like lobe along full midlength, outside with long setae, inside with shorter setae and dense cover of short hairs. Tegmen (Figs. 27D, H) with sclerotized basal structure that is shaped like an inverted V and runs distad into narrow, dark longitudinal band, laterally with very weak contours, distal margin rounded, its ventral plate proximally with sclerotized structure that runs distad into weakly sclerotized, pointed process (Fig. 27D) or this process less distinct (Fig. 27H),



Figs. 27A-H: *Peromyia carinata* sp. n., male; A, E: flagellomere 4, lateral view (0.05 mm); B, F: genitalia, ventral view (0.05 mm); C, G: gonostylus, dorsal view (0.02 mm); D, H: tegmen, ventral view (0.05 mm). A, B, D: holotype, C: paratype from Ogawa, E-H: specimen from Amami Oshima. (In parentheses: length of scale bar.)

with rounded distal margin just below tip of tegmen. Tergite 9 very short, forming a sclerotized semicircle with medial interruption of sclerotization, with interrupted row of setae along distal margin. Tergite 10 very narrow and weak, pubescent and with a few short setae. Sternite 10 obviously lacking.

Female. Unknown.

Types. Holotype: male, no. A0543, Japan, Honshu, Kukizaki Town, Matsunosato, over rotten oak logs for mushroom (shiitake) cultivation, 13 May 1999, by exhaustor, leg. Jaschhof [in KUEC]. Paratypes: 5 males, no. A0544-A0548, same data as holotype [no. A0548 in KUEC, the others in ZIMG].

Discussion. This species differs from other group members in that the gonostylar lobe is only poorly set off from the main gonostylar body, the lobe is keel-like and extends the full inside length of gonostylus. Additionally, tegmen structures in *carinata* show clearer contours resulting from stronger sclerotization or pigmentation. Specimens from the Ryukyu Islands, in particular a large series taken in Amami Oshima, Uken Village (cf. Figs. 27E-H), have their gonostyli shorter and thicker, their tegmen with somewhat different ventral plate, and their palpi always three-segmented. First, this series of specimens was thought to belong to a species distinct from the Honshu specimens (including types, cf. Figs. 27A-D) until several specimens from Kyushu and Okinawa were found that were rather intermediate. Consequently, for the time being I consider all the specimens listed below belonging to one and the same species.

Distribution and biology. Hn (Ib), Ku (Fu, Kt, Mz), Ry-Km, Ry-Ow, Bo-To.

Specimens of *carinata* were captured in various types of forest, such as deciduous (dominated by beech, *Fagus crenata*), evergreen broad-leaved, and mixed broad-leaved / coniferous, up to 600 m a. s. l. The type series was collected over rotten oak logs formerly used for mushroom (shiitake) cultivation. Flight period: Hn: V; Ku: IV-V, X; Ry: III, V; Bo-To: I, XI.

Etymology. The name is Latin and means "keel-formed", referring to the shape of gonostyli in this species.

Other material studied (45 males). Hn: Ib, Kitaibaraki City, Sadanami, Ogawa Research Forest, 3 May 1999, leg. Jaschhof, 2 males, no. A0550-A0551; Ku: Fu, Mt. Tachibana, 25 May 2000, leg. Jaschhof, 1 male, no. A1038; Kt, Kumamoto City, Tatsudayama Experimental Forest, 21 April-31 May 1999, leg. Ito, 1 male, no. A1119; Mz, Aya Town, Aya Research Forest, 6 Oct. 1999, leg. Jaschhof, 4 males, no. A1030-A1032, A1034; Ry: Km, Amami Oshima, Uken Village, 27 March 1999, leg. Jaschhof, 20 males, no. A0517-A0536; same data, but 28 March 1999, 4 males, no. A0537-A0540; Amami Oshima, Kawauchi Village, Kamiya Forest, 26 March 1999, 1 male, no. A0541; Ow, Okinawa, Yambaru Peninsula, Yona Village, 18 March 1999, leg. Jaschhof, 1 male, no. A0542; Okinawa, Yambaru Peninsula, Mt. Nishimedake, 12 May 2000, leg. Jaschhof, 1 male, no. A1033; Okinawa, Yambaru Peninsula, Benoki Dam, 15 May 2000, leg. Jaschhof, 8 males, no. A1039-A1046; Bo-To: Chichijima, Mt. Kohi, 17 Nov.-1 Dec. 1998, leg. Ohbayashi & Jaschhof, 1 male, no. A0552; same locality, but 12 Jan.-1 Febr. 1999, 1 male, no. A0553.

Peromyia centrosa sp. n.

(Figs. 28A-D)

Male. Body size: 0.7-0.8 mm.

Head: Postfrons non-setose. Eye bridge 1-2 facets long laterally and 2-3 facets at vertex. With 1 row of postocular bristles. Antennae with 12 flagellomeres; terminal flagellomere slightly constricted. Flagellomere 4 (Fig. 28A) with neck a little longer than node; node with single to double whorl of short scales basally, next to it with single to double whorl of long setae, distally with whorl of fine, long sensory hairs, additionally

with a few stronger, long sensory hairs and sensory spines. Palpi usually 4-segmented (in one specimen 3 and 4-segmented).

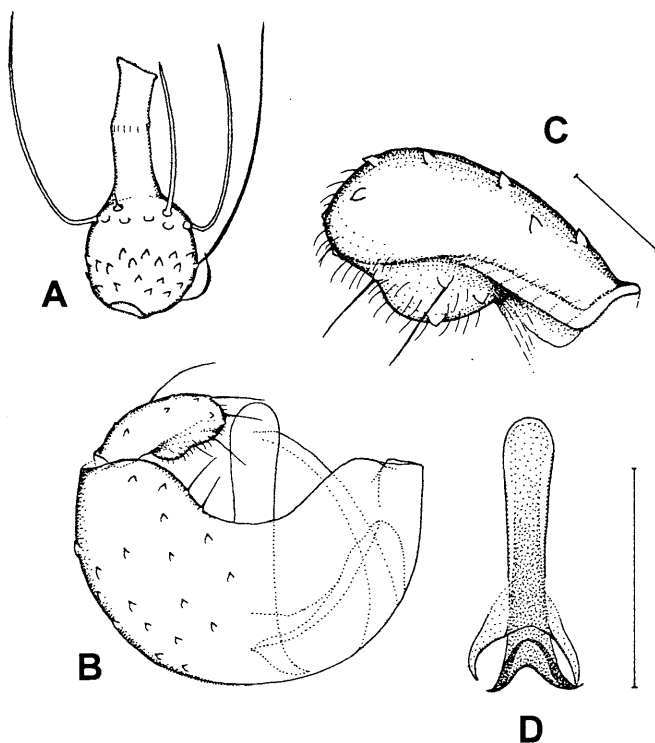
Thorax: Scutum with sparse lateral and dorsocentral rows of setae. Empodia as long as claws. Claws without teeth. Wings: $R1 = 2.5-3\text{ rs}$, strong anterior portion of C extending beyond point of intersection with R5 for 1-2 times the vein width of R5.

Abdomen/pattern of tergal plaques: 0/2/2/2/1/1/0/0.

Genitalia: Gonocoxites (Fig. 28B) covered with long setae and scales ventrally, distal margin with wide, shallow emargination. Gonostyli (Figs. 28B, C) elongate, inside with small, central swelling having short, fine setae and dense, short hairs, outside with long setae. Tegmen (Fig. 28D) long and narrow, membranous except sclerotized basal structure that is formed like an inverted V and runs distad into dark longitudinal band, in holotype with weakly sclerotized shield (ventrally?) that is not visible in other specimens, ventral plate very weak with only its proximal margin visible. Tergite 9 very short, forming a sclerotized semicircle with medial interruption of sclerotization, with interrupted row of setae along distal margin. Tergite 10 very weak and bare. Sternite 10 obviously lacking.

Female. Unknown.

Types. Holotype: male, no. A1047, Japan, Kyushu, Miyazaki Pref., Aya Town, Aya



Figs. 28A-D: *Peromyia centrosa* sp. n., male; A: flagellomere 4, dorsolateral view (0.05 mm), B: genitalia, ventral view (0.05 mm); C: gonostylus, dorsal view (0.01 mm); D: tegmen, ventral view (0.05 mm). A-D: holotype. (In parentheses: length of scale bar.)

Research Forest, in mature, evergreen broad-leaved forest, 400-600 m, 5-20 Oct. 1999, by Malaise trap, leg. Jaschhof [in KUEC]. Paratypes: 1 male, no. A1048, same data as holotype, but 7 Oct. 1999, by exhaustor; 1 male, no. A1049, Kyushu, Nagasaki Pref., Sotome Town, in secondary evergreen broad-leaved forest, 400 m, 11 Oct. 1999, by exhaustor, leg. Jaschhof; 1 male, no. A1050, Ryukyu Islands, Kagoshima Pref., Amami Oshima, Kawauchi Village, Kamiya Forest, in evergreen broad-leaved forest, 30 March 1999, by exhaustor, leg. Jaschhof; 1 male, no. A1051, Okinawa Pref. Okinawa, Yambaru Peninsula, Mt. Nishimedake, 300 m, in evergreen broad-leaved forest, 13 May 2000, by exhaustor, leg. Jaschhof; Okinawa, Yambaru Peninsula, Benoki Dam, 300 m, in evergreen broad-leaved forest, 15 May 2000, by exhaustor, leg. Jaschhof [all in ZIMG].

Discussion. Gonostyli in *centrosa* are reminiscent of that in *P. carinata*, but the inner lobe is not keel-like (as in *carinata*) but wart-like and restricted to the central portion of gonostyli (not extending along the full length of inner side). Additionally, the tegmen in *centrosa* is slenderer and widely unmodified.

Distribution and biology. Ku (Ns, Mz), Ry-Km, Ry-Ow.

Specimens of *centrosa* were collected in various evergreen broad-leaved forests up to 600 m a. s. l. Flight period: Ku: X; Ry: III, V.

Etymology. The name is Latin meaning "central", or "internal" and refers to the gonostyli having a small lobe inside that occupies a central position.

***Peromyia intermedia* (Kieffer, 1895)**

(Figs. 29A-C)

Supplement to description. Male.

Head: Postfrons non-setose.

Thorax/wings: Strong anterior portion of C extending beyond point of intersection with R5 for 1-2 times the vein width of R5, R1 = up to 3.5 rs.

Abdomen/pattern of tergal plaques: 0 / 2 / 2 / 2 / 1 / 0-1 / 0 / 0.

Genitalia: Gonostyli (Figs. 29A, B) somewhat variable in shape, i. e. with their inner lobe not always sharply set off (B) but sometimes with rather smooth transition into the main lobe (A), with some of the subbasal setae spine-like sometimes. In Japanese specimens, tegmen (Fig. 29C) without double margin distally (cf. Jaschhof 1998: 458, Fig. 208c). Tergit 10 present but inconspicuous, bare except 1-2 weak setae.

Discussion. Japanese specimens of *intermedia* appear to be more variable than those described from Germany (cf. Jaschhof l. c.). The structure of tegmen, i. e. in particular its distal portion, differs slightly if Japanese and German specimens are compared. The same applies to the gonostyli that may have their subbasal setae spine-like sometimes. I consider these differences too little in order to separate specifically Japanese from European specimens of *intermedia*.

Distribution and biology. New record for Japan. Hn (Ao, Iw, Ib, Nn, Ky), Ku (Fu, Mz).

Specimens of *intermedia* were captured in both deciduous (with and without beech) and evergreen-broad-leaved forests, sometimes mixed with conifers, in 400-1550 m a. s. l. Additional specimens were taken twice over rotten oak logs for mushroom (shiitake) cultivation. Flight period: Hn: IV-XI; Ku: X.

Material studied (17 males). Hn: Ao, Towadako Town, Tsuta hot spring, 25 June-28 July 1999, leg. Jaschhof, 3 males, no. A1053-A1055; Iw, Tamayama Village, Koma, 26 May-15 June 1999, leg. Gotoh, 1 male, no. A1056; Ib, Kitaibaraki City, Sadanami, Ogawa Forest, 6-20 Aug. 1996, leg. Maeto, 1 male, no. A0511; Kukizaki Town, Matsunosato, 3 June 1999, leg. Jaschhof, 1 male, no. A1057; same locality, but 21-28

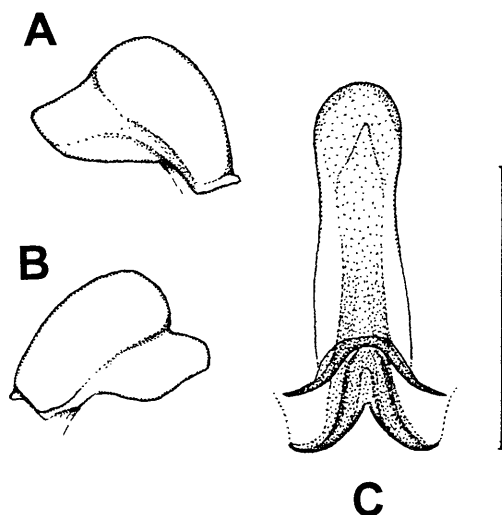


Fig. 29A-C: *Peromyia intermedia* (Kief.), male; A: gonostylus, dorsal view; B: gonostylus, ventral view; C: tegmen, ventral view. A: specimen from Aomori Pref., B: from Miyazaki Pref., C: from Ibaraki Pref. (Length of scale bar: 0.05 mm.)

April 1999, 1 male, no. A1263; Mt. Tsukuba, 12 May 1999, leg. Jaschhof, 1 male, no. A1127; Nn, Azumi Village, Norikurakogen, 14 July 2000, leg. Jaschhof, 1 male, no. A1412; Ky, Kyoto City, Kuta Research Forest, 22 Sept.-24 Oct. 1999, leg. Jaschhof, 1 male, no. A1058; Kyoto City, Fushimi, Momoyama, mid-Oct.-mid-Nov. 1999, leg. Fujita, 1 male, no. A1166; Ku: Fu, Saigawa Town, Mt. Sanda, 1-21 Oct. 1999, leg. Jaschhof, 1 male, no. A1059; Mz, Aya Town, Aya Research Forest, 5-20 Oct. 1999, leg. Jaschhof, 1 male, no. A1060; same locality, but 6 Oct. 1999, 2 males, no. A1061-A1062; Takachiho Town, 15 Oct. 1999, leg. Jaschhof, 2 males, no. A1063-A1064.

Remark. The original description of *Peromyia intermedia* was published in Misc. ent., 3(6): 62 (not Misc. ent., 3(7): 74-75, as stated by Jaschhof (1998: 458)).

***Peromyia miyazakiensis* sp. n.**

(Figs. 30A-E)

Male. Body size: 0.7 mm.

Head: Postfrons non-setose. Eye bridge 1-2 facets long laterally and 2-3 facets at vertex. With 1 row of postocular bristles. Antennae with 12 flagellomeres; terminal flagellomere slightly constricted. Flagellomere 4 (Fig. 30A) with neck a little longer than node; node with single to double whorl of short scales basally, next to it with single to double whorl of long setae, distally with whorl of fine, long sensory hairs, additionally with a few stronger, long sensory hairs and sensory spines. Palpi 3 to 4-segmented (3 segments rather exceptional).

Thorax: Scutum with sparse lateral and dorsocentral rows of setae. Empodia as long as claws. Claws without teeth. Wings: $R_1 = 2.5-3$ rs, strong anterior portion of C extending point of intersection with R_5 for 1-2 times the vein width of R_5 .

Abdomen/pattern of tergal plaques: 0 / 2 / 2 / 2 / 1 / 0-1 / 0 / 0.

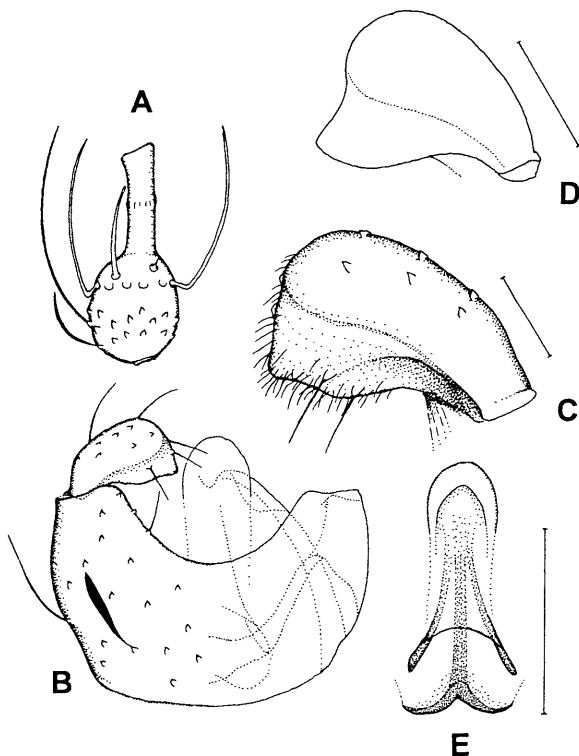
Genitalia: Gonocoxites (Fig. 30B) covered with long setae and scales ventrally, its distal margin with wide, shallow emargination. Gonostyli (Figs. 30B-D) with strongly

convex outer margin and slightly excavated inner side and thus looking curved, with the inner lobe having a usually smooth transition into the main gonostylar body but in other specimens inner lobe rather nose-like, with long setae elsewhere and dense, short hairs inside. Tegmen (Fig. 30E) with sclerotized basal structure that is formed like an inverted V and runs distad into narrow, dark longitudinal band, laterally with very weak contours, distal margin rounded, its ventral plate with sclerotized structure proximally that runs distad into tapering, dark band, distal margin of ventral plate just below tip of tegmen. Tergite 9 very short, forming a sclerotized semicircle with medial interruption of sclerotization, with interrupted row of setae along distal margin. Tergite 10 very small, bilobed, sparsely pubescent and with 1-2 fine setae. Sternite 10 obviously lacking.

Female. Unknown.

Types. Holotype: male, no. A1065, Japan, Kyushu, Miyazaki Pref., Hinokage Town, over rotten oak logs for mushroom (shiitake) cultivation, 300 m, 15 Oct. 1999, by exhaustor, leg. Jaschhof [in KUEC]. Paratypes: 6 males, same data as holotype [no. A1071 in KUEC, the others in ZIMG].

Discussion. This new species is morphologically in between *P. carinata* and *intermedia* in that its male genitalia have the tegmen largely corresponding with that in *carinata* and the gonostyli, at least sometimes, not unlike that in *intermedia*. From *carinata*,



Figs. 30A-E: *Peromyia miyazakiensis* sp. n., male; A: flagellomere 4, lateral view (0.05 mm); B: genitalia, ventral view (0.05 mm); C, D: gonostylus, dorsal view (0.01 mm); E: tegmen, ventral view (0.05 mm). A-C, E: holotype, D: specimen from Ibaraki Pref. (In parentheses: length of scale bar.)

miyazakiensis is easily distinguished by the shape of gonostyli (Figs. 27C, G compared with Fig. 30C). Compared with *intermedia*, tegmen in *miyazakiensis* is different (Fig. 29C compared with Fig. 30E). Specimens of *miyazakiensis* from Kyushu have their gonostyli with a rather smooth transition between inner lobe and main gonostylar body (Fig. 30C) while in *intermedia* the inner lobe is set off from the main body (Fig. 29B) or at least clearly nose-like (Fig. 29A). In specimens of *miyazakiensis* from Honshu, however, gonostyli are closer to those in *intermedia* in that their inner lobe is more prominent (Fig. 30D).

Distribution and biology. Hn (Ao, Ib), Ku (Mz).

Apart the type series (for details of habitat, see there), specimens of *miyazakiensis* were captured in a evergreen broad-leaved forest and in mixed deciduous forests dominated by beech (*Fagus crenata*). Flight period: Hn: V-VII; Ku: X.

Etymology. The name is derived from the prefecture, Miyazaki, where the type specimens originate from.

Other material studied (9 males). Hn: Ao, Towadako Town, Tsuta hot spring, 25 June-28 July 1999, leg. Jaschhof, 1 male, no. A1481; Ib, Kitaibaraki City, Sadanami, Ogawa Forest, 9-25 July 1996, leg. Maeto, 1 male, no. A1482; same data, but Ogawa Research Forest, 11 May-1 June 1999, leg. Jaschhof, 5 males, no. A1483-A1485, A1515-A1516; Ku: Mz, Aya Town, Aya Research Forest, 6 Oct. 1999, leg. Jaschhof, 1 male, no. A1072; same locality, but 7 Oct. 1999, 1 male, no. A1073.

***Peromyia lobata*-group**

Species of the *lobata*-group are characterized in having their gonostyli strikingly two-lobed or even three-lobed and their tegmen long, slender and with distinct, sclerotized ventral plate. Two-lobed gonostyli are present in species of the *intermedia*-group too, sometimes being similar to those described here, but in that group there is no tendency towards the development of a third lobe. Both groups, *lobata* and *intermedia*, are possibly sister-groups.

Three species of the *lobata*-group are known to occur in Japan, one of them is here described as new to science. *Peromyia anisotoma* Mam., described from Far East Russia, was too insufficiently described in order to decide whether it belongs to the *intermedia*- or *lobata*-group.

***Peromyia bihamata* Mamaev et Zaitzev, 1997**

(Figs. 31A, B)

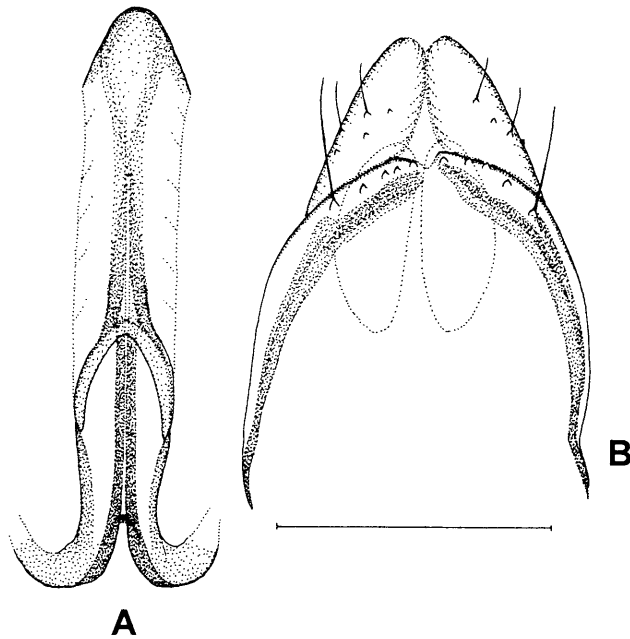
Supplement to description. Male.

Head: Postfrons non-setose. Eye bridge 1-2 facets long laterally and 2-3 facets at vertex. Node of antennal flagellomere 3 with single to double whorl of short setae basally, next to it with single to double whorl of long setae, medially with whorl of sensory hairs of various length, distally with irregular whorl of long sensory hairs and a few sensory spines. Palpi sometimes 4-segmented with its terminal segment longest, at least the 2 proximal segments with sensory hairs.

Thorax: Scutum with lateral and dorsocentral rows of setae. Claws apparently without teeth. Wings: R1 = up to 3 rs.

Abdomen: Pattern of tergal plaques uncertain.

Genitalia: Gonocoxites slender, ventrally with extremely deep, U-shaped emargination resulting in that its ventral gonocoxal bridge is very short, covered with long setae except its most proximal portion, dorsal gonocoxal bridge very narrow. Gonostyli bilobed with the main lobe cylindrical, very long and directed distad, evenly covered with setae, the other lobe much smaller and slender, forming an almost right angle with the main lobe, with short setae inside and fingernail-like tooth apically. Tegmen (Fig. 31A) slender and



Figs. 31A, B: *Peromyia bihamata* Mamaev et Zaitzev, 1997, male; A: tegmen, ventral view; B: tergites 9 and 10 and sternite 10, dorsal view. (Length of scale bar: 0.1 mm.)

very long, by far extending beyond distal margin of gonocoxites, its lateral margins with very weak contours, its apical portion distinct and apparently sclerotized, with dark longitudinal bar, ventral plate horseshoe-shaped with distal process that becomes increasingly weaker. Tergite 9 (Fig. 31B) forming a sclerotized semicircle with medial interruption of sclerotization, with interrupted row of long setae along distal margin. Tergite 10 and sternite 10 (Fig. 31B) elongate and very large each, bilobed, densely pubescent, tergite 10 additionally with a few fine setae and by far extending beyond distal margin of tergite 9.

Discussion. So far only the holotype of *Peromyia bihamata* has been known that was collected in Russian Far East (cf. Mamaev & Zaitzev 1997b). The single Japanese specimen belonging here I identified on the basis of the original description which includes illustrations of the male genitalia that are extremely modified and can be readily recognized in this species. Even when the original description lacks many details, I have no doubt about the correctness of my identification. The illustration in Mamaev & Zaitzev of tergite 9 in male terminalia (l. c.: 6, Fig. 2) may cause confusion by that the "triangular distal lobe" described by these authors goes actually back to tergite 10 (cf. Fig. 31B in this paper).

Distribution and biology. New record for Japan. Hn (Ib).

The single specimen known from Japan was collected in a mature deciduous forest dominated by beech (*Fagus crenata*) in 600 m a. s. l. Flight period: Hn: IV.

Material studied (1 male). Hn: Ib, Kitaibaraki City, Sadanami, Ogawa Research Forest, 18 April-3 May 1999, leg. Jaschhof, 1 male, no. A1372.

***Peromyia lobata* Yukawa, 1971**
(Figs. 32A-C)

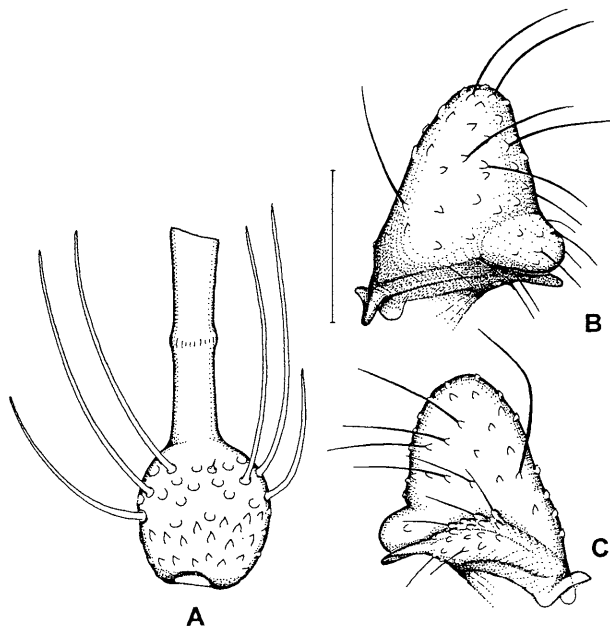
Supplement to description. Male.

Head: Postfrons non-setose. Flagellomere 4 (Fig. 32A) with neck longer than node; node with single to double whorl of short setae basally, next to it with single to triple whorl of long setae, medially with 1 whorl of short sensory hairs, distally with numerous long sensory hairs irregularly arranged.

Abdomen/pattern of tergal plaques: 0/2/2/2/1/1/0/0.

Genitalia: Gonocoxites ventrally with deep, U-shaped emargination extending beyond midlength of gonocoxites. Gonostyli (Figs. 32B, C) heavy, consisting of 3 lobes: its main lobe heavy, almost triangular but rounded distally, with long setae, another lobe at inner tip of the main lobe, much smaller than the latter, rounded and having short setae, the third lobe situated dorsoproximally, directed inwards, narrow and rather inconspicuous, with apical tooth-like structure and dense cover of short setae. Tegmen as described and figured by Yukawa (1971: 30, Fig. 6A) and Jaschhof (1998: 503, Fig. 235c). Tergite 9 forming a sclerotized semicircle with medial interruption of sclerotization, with interrupted row of long setae along distal margin. Tergite 10 and sternite 10 large, bilobed, densely pubescent, tergite 10 additionally with a few fine setae and extending beyond distal margin of tergite 9.

Discussion. As here proven by additional, better preserved material, *Peromyia lobata* was described (cf. Yukawa 1971) and redescribed (cf. Jaschhof 1998) on the basis of an inhomogeneous type series. This actually consists of specimens belonging to two different species, *P. lobata* and *trifida* (for the latter, see below). This situation explains the differences in male genitalia, particularly in gonostyli, that have been figured in the both papers cited. While the figure by Yukawa (l. c.: 30, Fig. 6A) shows the genitalia of the true *P. lobata*, illustrations in Jaschhof (l. c.) partly refer to *trifida* (cf. Figs. 235a, b,



Figs. 32A-C: *Peromyia lobata* Yukawa, 1971, male; A: flagellomere 4, lateral view; B: gonostylus, ventral view; C: gonostylus, dorsal view. A-C: specimen from Iwate Pref. (Length of scale bar: 0.05 mm.)

d), because at that time the best preserved specimens instead of the poorly preserved holotype was chosen to prepare the figures. Unfortunately, the type series of *lobata* was not available for a re-examination when I studied again the Yukawa collection in June, 2000. Thus it remains unclarified at present which of the paratypes do belong to *lobata* and which to *trifida*. For morphological differences between *lobata* and *trifida*, see under the latter.

Distribution and biology. Note that data on paratypes were not included here for the reason explained above. Hn (Iw), Ku (Fu).

Specimens of *lobata* were captured in deciduous as well as evergreen broad-leaved forests exclusively in autumn. Flight period: Hn: X-XI; Ku: IX.

Material studied (1 male). Hn: Iw, Tamayama Village, Koma, 12 Oct.-19 Nov. 1999, leg. Gotoh, 1 male, no. A1083.

***Peromyia trifida* sp. n.**

(Figs. 33A-D)

Male. Body size: 0.9-1.0 mm.

Head: Postfrons non-setose. Eye bridge 1-2 facets long laterally and 2-3 facets at vertex. With 1 row of postocular bristles. Antennae with 12 flagellomeres; terminal flagellomere constricted and with small additional node. Flagellomere 4 (Fig. 33A) with neck much longer than node; node with single to double whorl of short setae basally, next to it with single to triple whorl of long setae, medially, just beyond setae, with whorl of short sensory hairs, distally with whorl of long sensory hairs and additionally a few sensory spines. Palpi 3 to 4-segmented, the 2 proximal segments with fairly long sensory hairs.

Thorax: Scutum with very sparse lateral and dorsocentral rows of setae. Empodia as long as claws. Claws of midlegs with 2 minute teeth. Wings: R1 = 3-4 rs, strong anterior portion of C ending at point of intersection with R5 or extending for once the vein width of R5.

Abdomen/pattern of tergal plaques: 0 / 2 / 2 / 1-2 / 1 / 0-1 / 0-1 / 0.

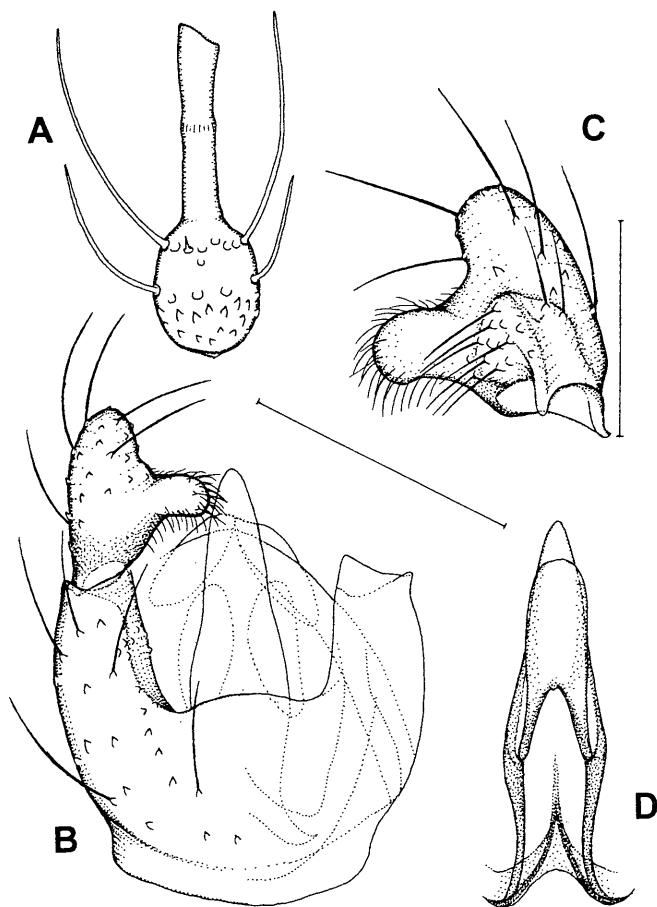
Genitalia: Gonocoxites (Fig. 33B) covered with long setae ventrally except their membranous central and most proximal portions, its distal margin with wide, almost rectangular emargination extending to less than midlength of gonocoxites, with dorsal transverse bridge wide. Gonostyli (Figs. 33B, C) heavy, three-lobed, with the main lobe directed distad and having long setae, with rounded, nose-like inner lobe that is a little smaller than the main lobe and has a few fine setae and dense cover of long hairs, with subbasal lobe dorsally that is densely covered with long setae. Tegmen (Fig. 33D) long and slender, widest in proximal half and pointed at tip, with distinct ventral plate that in distal half is joined by an articulation with the tegmen margin, ventral plate with rounded distal margin and deeply emarginated proximal margin. Tergite 9 rather long, almost V-shaped with medial interruption of sclerotization, with interrupted row of long setae along distal margin. Tergite 10 and sternite 10 bilobed, large, densely pubescent, tergite 10 extending beyond distal margin of tergite 9.

Female. Unknown.

Types. Holotype: male, no. A1084, Japan, Honshu, Iwate Pref., Tamayama Village, Koma, in secondary deciduous forest dominated by oak (*Quercus crispula*), 12 Oct.-19 Nov. 1999, by Malaise trap, leg. Jaschhof [in KUEC]. Paratypes: 2 males, no. A1085-A1086, same data as holotype [in ZIMG].

Discussion. Now, after having studied well preserved specimens of both species, it is obvious that there are clear differences between *trifida* and *lobata* in respect to their male genitalia and vestiture of their antennal flagellomeres. See also *Peromyia lobata* (above).

Distribution and biology. Hn (Iw, Ib, Hy).



Figs. 33A-D: *Peromyia trifida* sp. n., male; A: flagellomere 4, lateral view (0.1 mm); B: genitalia, ventral view (0.1 mm); C: gonostylus, dorsal view (0.05 mm); D: tegmen, ventral view (0.01 mm). A-D: holotype. (In parentheses: length of scale bar.)

Specimens of *trifida* were captured in deciduous forests (with and without beech) up to 1200 m a. s. l. in autumn and winter. Flight period: Hn: IV, IX-XII.

Etymology. The name is Latin and means "three-clefted" referring to the structure of gonostyli in this species.

Other material studied (3 males). Hn: Ib, Kukizaki Town, Matsunosato, 28 Dec. 1995, leg. Isono, 1 male, no. A1087; same locality, but 21-28 April 1999, leg. Jaschhof, 1 male, no. A1260; Hy, Mt. Hyonosen, 28 Sept. 1995, leg. Jaschhof & Yagi, 1 male, no. A1088.

Peromyia modesta-group

The *modesta*-group, as described earlier (cf. Jaschhof 1998: 459f.), cannot be characterized by synapomorphic characters of its members and is consequently not necessarily a monophyletic group. The species included correspond in that most of their adults are big-sized (compared with other *Peromyia*) and in that the males have their genitalia with heavy, cylindrical gonostyli and the tegmen heavy with distinct ventral

plate. Additionally, many of its species share the same structure of antennal flagellomeres with two whorls of sensory hairs (regardless of additional setae).

Thirteen of about 19 holarctic species are distributed in Japan, nine of them are here described as new to science. Mamaev (1998b: 5) considered *Peromyia horridula* Jaschhof, 1997 a synonym of *P. sacculiformia* Mamaev et Berest, 1990, after he had compared the description of *horridula* with the holotype of *sacculiformia*. The identity of the two species I have earlier taken into account (cf. Jaschhof 1998: 460), but as long as I have not seen myself the type of *sacculiformia* (and that of the similar *P. concitata* Mamaev et Berest, 1994), I consider these three species distinct. Among the *Peromyia* species that have been recently described also *P. longicostalis* Mamaev et Zaitzev, 1997 from Sweden probably belongs to the *modesta*-group. This species might be close to, or even identical with, *P. discreta* Jaschhof, 1997 that also was described from Sweden.

***Peromyia ampla* sp. n.**

(Figs. 34A-C)

Male. Body size: 1.0-1.2 mm.

Head: Postfrons non-setose. Eye bridge 1-2 facets long laterally and 2-3 facets at vertex. With 1 sparse row of postocular bristles and a few additional bristles that sometimes form an short, irregular posterior row. Antennal flagellum with 12 flagellomeres; terminal flagellomere slightly constricted resulting in indistinct additional node. Flagellomere 4 (Fig. 34A) with neck longer than node; node with single to double whorl of short setae basally, next to it with single to double whorl of long setae, in between these setae with irregularly arranged short sensory hairs, distally with numerous sensory hairs of various length with some of them sometimes forming an irregular whorl, additionally with a few sensory spines. Palpi 4-segmented, also second and sometimes third segments with a few sensory hairs.

Thorax: Scutum with lateral and dorsocentral rows of setae. Empodia as long as claws. Claws without teeth. Wings: R1= 3-4 rs, strong anterior portion of C extends point of intersection with R5 for once the vein width of R5.

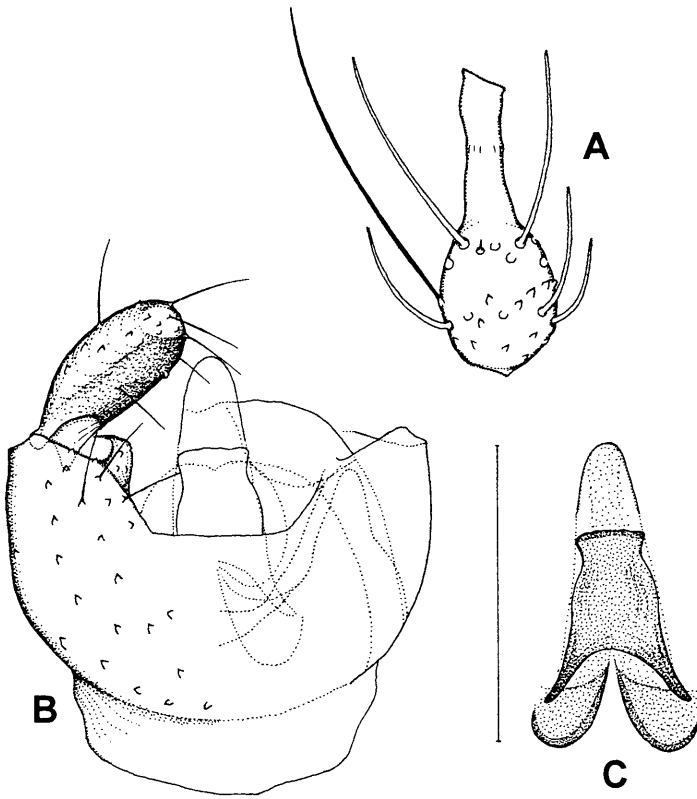
Abdomen/pattern of tergal plaques: 0 / 2 / 2 / 2 / 1 / 1 / 0-1 / 0.

Genitalia: Gonocoxites (Fig. 34B) covered with setae ventrally except their membranous central and most proximal portions, its distal margin with wide, shallow emargination extending to much less than midlength of gonocoxites, inner gonocoxal bridge strongly sclerotized. Gonostyli (Fig. 34B) heavy, slender in lateral view but strongly flattened and broad when seen from above, slightly curved inwards, covered with long setae elsewhere, with at least 1 of the dorsal setae short and spine-like. Tegmen (Fig. 34C) heavy, almost parallel-sided, with rounded distal margin, its ventral plate strongly sclerotized and with distinct proximal margin forming an inverted U and with strikingly cut distal margin. Tergite 9 fairly long, forming a sclerotized semicircle with medial interruption of sclerotization, with groups of long setae along its distal margin. Tergite 10 heavy, bilobed, densely pubescent and with short setae, extends beyond distal margin of tergite 9. Sternite 10 large, slightly bilobed, densely pubescent.

Female. Unknown.

Types. Holotype: male, no. A1528, Japan, Honshu, Ibaraki Pref., Kitaibaraki City, Sadanami, Ogawa Research Forest, in mature, mixed deciduous forest dominated by beech (*Fagus crenata*), 600 m, 11 May-1 June 1999, by Malaise trap, leg. Jaschhof [in KUEC]. Paratypes: 9 males, no. A1529-A1537, same data as holotype [no. A1529-A1530 in KUEC, the others in ZIMG].

Discussion. Within the *modesta*-group, this new species is close to *P. gryphiswaldensis* (see below), *suberis*, and *vernalis* (see below). From all these species *ampla* is distinguished by the different vestiture of its antennal flagellomeres and its male



Figs. 34A-C: *Peromyia ampla* sp. n., male; A: flagellomere 4, lateral view; B: genitalia, ventral view; C: tegmen, ventral view. A-C: holotype. (Length of scale bar: 0.01 mm.)

genitalia having strongly flattened and broad gonostyli and the tegmen with strikingly cut distal margin. When first seen, the latter character was thought to be a deformity, but it is not since found stable in all specimens studied. For ~~comparison~~, see also under *P. vernalis* (below).

Distribution and biology. Hn (Ib).

For details of habitat and flight period, see under types.

Etymology. The name is a Latin adjective meaning "great", or "strong".

***Peromyia anocellata* sp. n.**

(Figs. 35A-C)

Male. Body size: 1.1 mm.

Head: Shorter but higher compared with congeners and bulbous at vertex. Postfrons non-setose. Ocelli absent. Eye bridge 5-6 facets long laterally and 4-5 facets at vertex. Occiput with its setation largely reduced to vertex. With 1 row of postocular bristles. Antennae with 12 flagellomeres; terminal flagellomere constricted and with additional small, ovoid node. Flagellomere 4 (Fig. 35A) with neck longer than node; node with single to triple whorl of short setae basally, next to it with double to triple whorl of long setae, medially with irregular whorl of short sensory hairs, distally with whorl of long sensory hairs and a few sensory spines. Palpi 3-segmented; segments gradually

decreasing in length, terminal segment very short, also second segment with some sensory hairs.

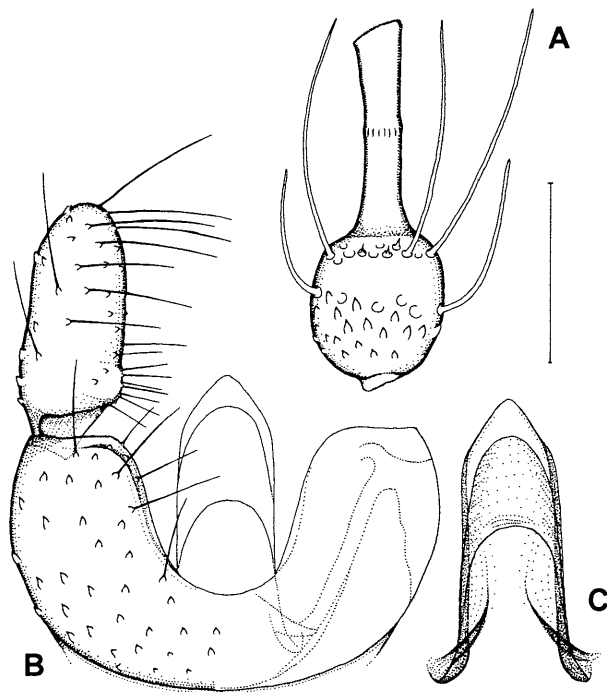
Thorax: Scutum with lateral and dorsocentral rows of setae. Empodia as long as claws. Claws without teeth. Wings: R1 = 3-3.5 rs, strong anterior portion of C ending at point of intersection with R5.

Abdomen: Pattern of tergal plaques uncertain.

Genitalia: Gonocoxites (Fig. 35B) clearly wider than long, covered with setae ventrally, its distal margin with wide, deep U-shaped emargination. Gonostyli (Fig. 35B) strikingly directed distad, covered with setae that are longer distally than proximally, gonostyli a little shorter than gonocoxites, parallel-sided, cylindrical and rounded distally, with slight setose lobe inside subbasally. Tegmen (Fig. 35C) extending far beyond distal margin of gonocoxites, parallel-sided and tapered to tip in distal fourth, in distal half with distinct ventral plate with its proximal and distal margins formed like inverted U's. Tergite 9 forming a sclerotized semicircle with medial interruption of sclerotization, with interrupted row of setae along distal margin. Tergite 10 and sternite 10 large, bilobed, densely pubescent.

Female. Unknown.

Types. Holotype: male, no. A0220, Japan, Honshu, Ibaraki Pref., Abukuma Highlands, Kitaibaraki City, Sadanami, Ogawa Forest, in secondary deciduous forest, 600 m, 9-25 July 1996, by Malaise trap, leg. Maeto [in KUEC]. Paratypes: 5 males, no. A0221-A0225, same data as holotype [all in ZIMG].



Figs. 35A-C: *Peromyia anocellata* sp. n., male; A: flagellomere 4, lateral view; B: genitalia, tergites 9 and 10 and sternite 10 omitted, ventral view; C: tegmen, ventral view. A-C: holotype. (Length of scale bar: 0.05 mm.)

Discussion. *Peromyia anocellata* is the only *Peromyia* species known that lacks the ocelli. Additionally, its head is unusually short but high and vertex is bulbous. Alone by these features this species can be readily identified. It best fits the *modesta*-group by characters of its male genitalia: its gonostyli are cylindrical and widely unmodified and the tegmen is heavy with distinct ventral plate. Gonostyli are strikingly caudad directed and have a small subbasal lobe.

Distribution and biology. Hn (Ib, Os), Sh (Ko).

Most specimens of *Peromyia anocellata* were captured in a deciduous forest dominated by beech (*Fagus crenata*), additional specimens were taken in mixed evergreen broad-leaved / coniferous forests. Flight period: Hn: V, VII-IX; Sh: VI.

Etymology. The name refers to the absence of ocelli in this species.

Other material studied (5 males). Hn: same locality as types, but 6-20 Aug. 1996, 2 males, no. A0335-A0336; same data, but Ogawa Research Forest, 11 May-1 June 1999, leg. Jaschhof, 1 male, no. A1451; Os, Mino, 29 Sept. 1995, leg. Jaschhof, 1 male, no. A0226; Sh: Ko, Yusuhara Town, Takatori-yama Forest Reserve, 1-16 June 2000, leg. Maeto, 1 male, no. A1490.

***Peromyia boreophila* sp. n.**

(Figs. 36A-C)

Male. Body size: 0.9-1.0 mm.

Head: Postfrons non-setose. Eye bridge 1-2 facets long laterally and 2-3 facets at vertex. With 1 row of postocular bristles (sometimes with a few bristles forming a very short posterior row). Antennae with 12 flagellomeres; terminal flagellomere constricted and with small additional node. Flagellomere 4 (Fig. 36A) with neck a little longer than node; node with single to double whorl of short setae basally, next to it with double to triple whorl of long setae, medially, just beyond setae, with whorl of short sensory hairs, distally with irregular whorl of long sensory hairs and additionally a few fine sensory hairs and sensory spines. Palpi 4-segmented, the 3 proximal segments with fairly long sensory hairs.

Thorax: Scutum with lateral and dorsocentral rows of setae. Empodia as long as claws. Claws without teeth. Wings: R1 = 2.5-3 rs, strong anterior portion of C extending point of intersection with R5 for 1-2 times the vein width of R5.

Abdomen/pattern of tergal plaques: 0 / 2 / 2 / 2 / 1 / 1 / 0 / 0.

Genitalia: Gonocoxites (Fig. 36B) covered with setae and scales ventrally except its small membranous central portion, its distal margin with emargination extending to less than midlength of gonocoxites, dorsal transverse bridge very wide (a consistent feature in all specimens studied). Gonostyli (Fig. 36B) elongate, with their tips directed ventrad, slightly curved inwards and tapered to tip, with long setation elsewhere but most dense at apex. Tegmen (Fig. 36C) almost parallel-sided, with broadly rounded distal margin, in distal half with distinct, short, horseshoe-shaped ventral plate. Tergite 9 forming a sclerotized semicircle with medial interruption of sclerotization, with interrupted row of setae along distal margin. Tergite 10 and sternite 10 bilobed, large, densely pubescent, tergite 10 additionally with a few short setae.

Female. Unknown.

Types. Holotype: male, no. A0448, Japan, Hokkaido, Soya Sub-Pref., Rishiri Island, Rishiri Town, in subalpine forest dominated by fir (*Abies sachalinensis*), 200-300 m, 13 July 1999, by sweepnet, leg. Jaschhof [in KUEC]. Paratypes: 3 males, no. A0449-A0451, same data as holotype; 3 males, no. A0452-A0454, Hokkaido, Kamikawa Sub-Pref., Furano City, Rokugo Village, Tokyo University Experimental Forest, in subalpine forest dominated by fir (*Abies sachalinensis*), 400-500 m, 6 July 1999, by sweepnet, leg. Jaschhof [all in ZIMG].

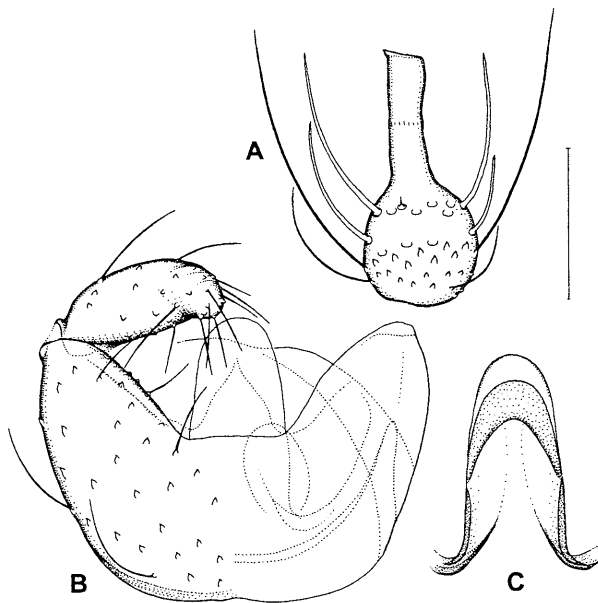
Discussion. In characters of its male genitalia, this new species has a somewhat intermediate position in between the *modesta*- and *perpusilla*-groups. It lacks gonocoxites with very strong ventral setae that could plead for belonging to the *perpusilla*-group. Gonostyli however are not as simply cylindrical as usually in members of the *modesta*-group but are reminiscent of those found in the *perpusilla*-group. Altogether, *boreophila* best fits characters of the *modesta*-group. Here it is among species having the flagellomeres with two whorls of sensory hairs. It resembles *P. ibarakiensis* in that gonostyli are heavy, curved and tapered in distal third, but both species differ in several other characters (see under *ibarakiensis*, below). Outside the *modesta*-group, *boreophila* might be confused with *P. tundrae* in the *perpusilla*-group, but the latter has two distinct rows of postocular bristles and its costa ends at the intersection with R5.

Distribution and biology. Hk (So, Kk), Hn (Ao, Ak, Iw, Ib).

This species was collected in forests which are most typical for northern Japan: deciduous forest dominated by beech (*Fagus crenata*), mixed deciduous forest (lacking *Fagus crenata* but dominated by oak, *Quercus crispula*), and subalpine forest dominated by fir (*Abies sachalinensis*). Here it may occur in big numbers. It was found up to 1000 m a. s. l. Flight period: Hk: VII; Hn: V-VII.

Etymology. The name means "loving the north", referring to the mainly northern Japanese distribution of this species.

Other material studied (30 males). Hk: Kk, Otoineppu Town, Hokkaido University Experimental Forest, 8-16 July 1999, leg. Jaschhof, 2 males, no. A0876-A0877; Hn: Ao, Towadako Town, Tsuta hot spring, 25 June 1999, leg. Jaschhof, 2 males, no. A0858-A0859; same locality, but 25 June-28 July 1999, 2 males, no. A0860-A0861; Ak, Minehama Village, Shirakami Mts., Mizusawa River Valley, 22 June 1999, leg. Jaschhof, 1 male, no. A0472; Iw, Tamayama Village, Koma, 26 May-15 June 1999, leg.



Figs. 36A-C: *Peromyia boreophila* sp. n., male; A: flagellomere 4, lateral view; B: genitalia, ventral view; C: tegmen, ventral view. A: paratype from Rishiri, B, C: holotype. (Length of scale bar: 0.05 mm.)

Gotoh, 14 males, no. A0862-A0875; same locality, but 15 June-4 July 1999, 3 males, no. A1094-A1096; Ashiro Town, Appi Highland, Mt. Appidake, 19 June-29 July 1999, leg. Jaschhof, 2 males, no. A1361-A1362; Ib, Kitaibaraki City, Sadanami, Ogawa Research Forest, 11 May-1 June 1999, leg. Jaschhof, 4 males, no. A1458-A1461.

***Peromyia cassa* sp. n.**

(Fig. 37A-D)

Male. Body size: 0.9 mm.

Head: Postfrons non-setose. Eye bridge 1-2 facets long laterally and 2-3 facets at vertex. With 1 row of postocular bristles. Antennae with 12 flagellomeres; terminal flagellomere constricted and with small additional node. Flagellomere 4 (Fig. 37A) with neck little longer than node; node with sparse and dorsally incomplete whorl of short setae basally, next to it with single to double whorl of long setae, distally with whorl of long, thin sensory hairs (that easily break) and additionally a few strong sensory hairs and sensory spines. Palpi 3 to 4-segmented, also second segment with a few sensory hairs.

Thorax: Scutum with sparse lateral and dorsocentral rows of setae. Empodia as long as claws. Claws without teeth. Wings: R1 = 2.5-3 rs, strong anterior portion of C extending point of intersection with R5 for once the vein width of R5.

Abdomen/pattern of tergal plaques: 0 / 2 / 2 / 2 / 1 / 1 / 0 / 0.

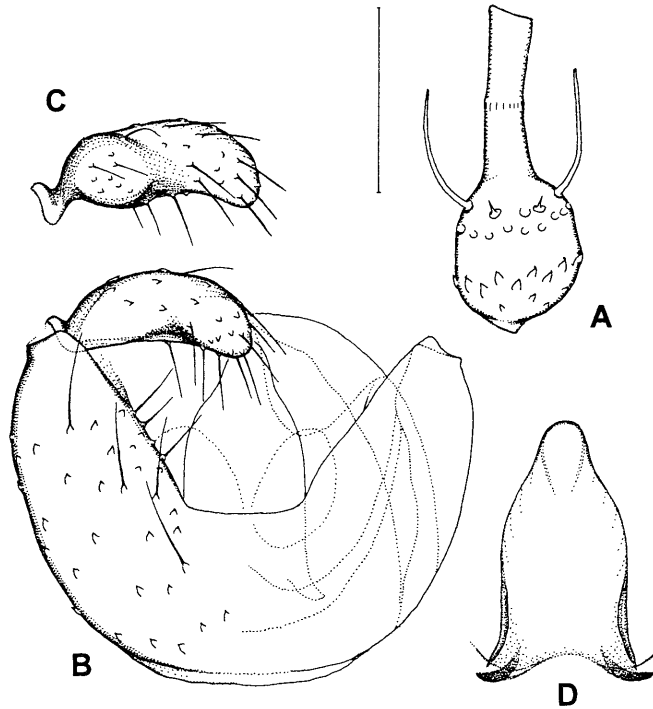
Genitalia: Gonocoxites (Fig. 37B) covered with setae and scales ventrally except its small membranous central portion, its distal margin with emargination sometimes extending beyond midlength of gonocoxites, dorsal transverse bridge very wide. Gonostyli (Figs. 37B, C) elongate, with their tips directed ventrad, curved inwards, with fairly short setae elsewhere and those of the dorsal side shorter and stronger, with subbasal lobe dorsally that is covered with fine, short setae. Tegmen (Fig. 37D) very simple, parallel-sided, in distal third tapered to tip, without any inner structure. Tergite 9 forming a sclerotized semicircle with medial interruption of sclerotization, with interrupted row of setae along distal margin. Tergite 10 and sternite 10 bilobed, large, densely pubescent.

Female. Unknown.

Types. Holotype: male, no. A1414, Japan, Honshu, Iwate Pref., Ashiro Town, Appi Highland, Mt. Appidake, in mature, mixed deciduous / coniferous forest, 1000 m, 19 June-29 July 1999, by Malaise trap, leg. Jaschhof [in KUEC]. Paratypes: 1 male, no. A1415, same data as holotype; 1 male, no. A1416, Honshu, Akita Pref., Kazuno City, Goshogake Mts., in mature, mixed deciduous forest dominated by beech (*Fagus crenata*), 1000 m, 21 June 1999, by sweepnet, leg. Jaschhof; 1 male, no. A1417, Honshu, Ibaraki Pref., Kitaibaraki City, Sadanami, Ogawa Research Forest, in mature, mixed deciduous forest dominated by beech (*Fagus crenata*), 600 m, 3-11 May 1999, by Malaise trap, leg. Jaschhof [all in ZIMG].

Discussion. By overall shape, *Peromyia cassa* is tentatively classified into the *modesta*-group even when it does not fit characters considered group-specific. Its male genitalia are similar to those in *P. fujiensis* in the *perpusilla*-group in having long, curved gonostyli and the tegmen without ventral plate. But gonocoxites in *cassa* lack particularly strong setae as they are found in species of the latter group. Differences between *cassa* and *fujiensis* include the different vestiture in antennal flagellomeres and the presence of lobed gonostyli in *cassa* compared with unlobed gonostyli in *fujiensis*. Among species of the *modesta*-group, *cassa* is easily distinguished by the combination of characters provided by antennal flagellomeres, gonostyli and tegmen.

Distribution and biology. Hn (Ak, Iw, Ib).



Figs. 37A-D: *Peromyia cassa* sp. n., male; A: flagellomere 4, lateral view; B: genitalia, ventral view; C: gonostylus, dorsal view; D: tegmen, ventral view. A, B, D: holotype, C: paratype from Akita Pref. (Length of scale bar: 0.05 mm.)

This species was collected in mature, deciduous forests dominated by beech (*Fagus crenata*) and sometimes mixed with conifers, in elevations between 600 and 1000 m a. s. l. Flight period: Hn: V-VII.

Etymology. The name is Latin meaning "empty, or hollow" and refers to the tegmen which has no inner structure in this species.

***Peromyia gryphiswaldensis* Jaschhof, 1997**

Discussion. Japanese specimens of *gryphiswaldensis* correspond widely with the type specimens from Germany except for the following details (in parentheses: German specimens): their first antennal flagellomeres lack additional sensory hairs basally (with an additional whorl of sensory hairs basally) and male genitalia have the sternite 10 without setae (with single setae). I consider these differences coming under infraspecific variability within the wide geographic range of this species. Compared with similar species (cf. *ampla*, *suberis*, and *vernalis*), *gryphiswaldensis* is best characterized by its heavy, cylindrical gonostyli and the tegmen with almost triangular ventral plate.

Distribution and biology. New record for Japan. Hn (Ib).

The two specimens known were found in a mature deciduous forest dominated by beech (*Fagus crenata*) in 600 m a. s. l. Flight period: Hn: V.

Material studied (2 males). Hn: Ib, Kitaibaraki City, Sadanami, Ogawa Research Forest, 3-11 May 1999, leg. Jaschhof, 1 male, no. A1383; same locality, but 11 May-1 June 1999, 1 male, no. A1525.

Peromyia horridula Jaschhof, 1997

Discussion. Japanese specimens of *horridula* listed below correspond with those described from Germany (cf. Jaschhof 1997) except that they have their antennal flagellomeres with the whorl of sensory hairs in a medial rather than a distal position. Two other specimens (no. A1387-A1388), collected at the same site as specimen no. A1389, differ in that the whorl of sensory hairs is situated clearly distally, but consists of long, thin sensory hairs (corresponding with those in, for example, *Peromyia modesta*). For the time being, I leave these latter specimens unidentified to species, but expect that this difference comes under infraspecific variability.

Distribution and biology. New record for Japan. Hn (Ib, Yn).

Japanese specimens certainly belonging to *horridula* were found in a mature deciduous forest dominated by beech (*Fagus crenata*) in 600 m a. s. l. (and here occurring in large numbers) and in a subalpine, mixed coniferous / deciduous forest in 1600 m a. s. l. Flight period: Hn: V-VI.

Material studied (24 males). Hn: Ib, Kitaibaraki City, Sadanami, Ogawa Research Forest, 3-11 May 1999, leg. Jaschhof, 1 male, no. A1389; same data, but 11 May-1 June 1999, 22 males, no. A1431-A1450, A1504-A1505; Yn, Oyama Town, Mt. Fuji, 4-13 June 1999, leg. Jaschhof, 1 male, no. A0888.

Peromyia ibarakiensis sp. n.

(Figs. 38A-C)

Male. Body size: 0.9-1.0 mm.

Head: Postfrons non-setose. Eye bridge 1-2 facets long laterally and 2-3 facets at vertex. With 1 sparse row of postocular bristles. Antennae with 12 flagellomeres; terminal flagellomere constricted resulting in small additional node. Flagellomere 4 (Fig. 38A) with neck longer than node; node with whorl of short setae basally that is sometimes incomplete, next to it with single to double whorl of long setae, medially with whorl of short sensory hairs, distally with whorl of long sensory hairs and single fine sensory hairs and spines. Palpi 3 to 4-segmented, segments gradually decreasing in length, also second (and third if 4-segmented) segment with a few sensory hairs.

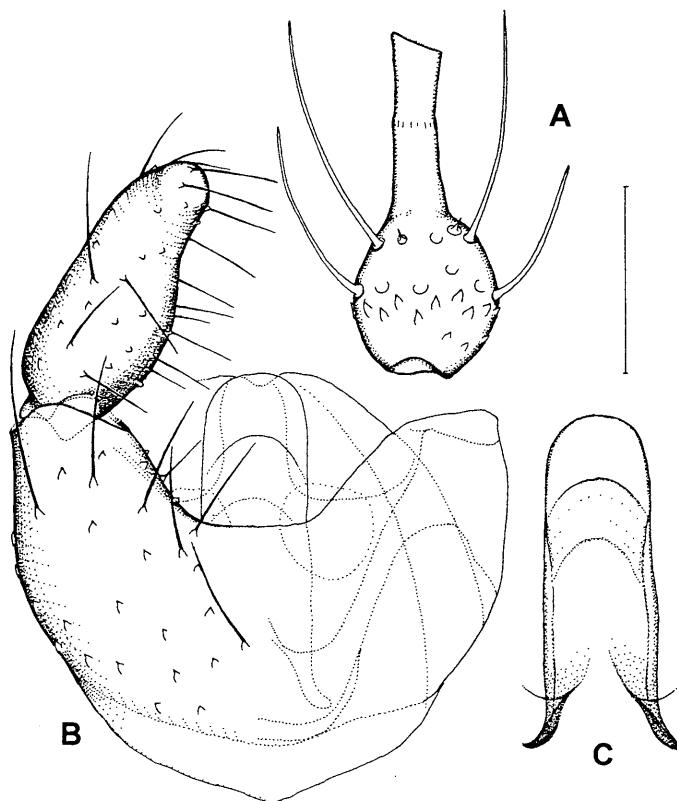
Thorax: Scutum with sparse lateral and dorsocentral rows of setae. Empodia as long as claws. Claws without teeth. Wings: R1 = 2.5-3 rs, strong anterior portion of C extending point of intersection with R5 for 3-4 times the vein width of R5.

Abdomen/pattern of tergal plaques: 0 / 2 / 2 / 2 / 1 / 1 / 0 / 0.

Genitalia: Gonocoxites (Fig. 38B) comparatively short, covered with long setae except their small, membranous central and unpigmented most proximal portions, its distal margin with wide, shallow emargination extending to less than midlength of gonocoxites. Gonostyli (Fig. 38B) heavy, with their tips directed distoventrad and thus appearing to be shorter in ventral view, as long as gonocoxites or even longer, slightly to clearly bulbous inside in proximal half and tapering to tip in distal half, covered with long setae. Tegmen (Fig. 38C) heavy, elongate, parallel-sided, rounded distally, with short, weak ventral plate in distal half. Tergite 9 forming a sclerotized semicircle with wide medial interruption of sclerotization, with interrupted row of setae along distal margin. Tergite 10 and sternite 10 bilobed each, large, with dense pubescence that is as long and strong as in species of the *Bryomyiini*.

Female. Unknown.

Types. Holotype: male, no. A1418, Japan, Honshu, Ibaraki Pref., Kitaibaraki City, Sadanami, Ogawa Research Forest, in mature, mixed deciduous forest dominated by beech (*Fagus crenata*), 600 m, 3-11 May 1999, by Malaise trap, leg. Jaschhof [in



Figs. 38A-C: *Peromyia ibarakiensis* sp. n., male; A: flagellomere 4, dorsolateral view; B: genitalia, ventral view; C: tegmen, ventral view. A-C: holotype. (Length of scale bar: 0.05 mm.)

KUEC]. Paratypes: 7 males, no. A1419, A1452, A1520-A1524, same data as holotype, but 11 May-1 June 1999 [all in ZIMG].

Discussion. With respect to male genitalia, this new species is most similar to *P. boreophila* and *montivaga*. *Peromyia ibarakiensis* is readily distinguished from *montivaga* (in parentheses) by its antennal flagellomeres having two whorls of sensory hairs (one whorl). Compared with *boreophila*, *ibarakiensis* has the costa longer, its gonostyli are broader in proximal half and longer, its tegmen has the ventral plate weaker, and the pubescence of sternite 10 is strikingly strong (rather inconspicuous in *boreophila*).

Distribution and biology. Hn (Ib).

For details of habitat and flight period, see under types.

Etymology. The name is derived from the prefecture, Ibaraki, where the type material originates from.

Peromyia modesta (Felt, 1907)

Supplement to description. Male.

Head: Postfrons sometimes non-setose.

Abdomen/pattern of tergal plaques: 0 / 2 / 2 / 2 / 1 / 1 / 0 / 0.

Discussion. Japanese specimens of *modesta* lack obviously postfrontal setae or scales (that are present in specimens from other regions, cf. Jaschhof 1998: 463), but this feature is hard to see in most specimens studied.

Distribution and biology. New record for Japan. Hk (Ir), Hn (Ao, Ak, Iw, Hy).

The species was found in northern Japan and in submountainous elevations in western Japan. Adults were captured in various deciduous forests (within and north of the beech zone) up to 1200 m a. s. l. Flight period: Hk: VI-IX; Hn: V-VII, IX.

Material studied (12 males). Hk: Ir, Sapporo City, Toyohira, 29 June-26 July 1999, leg. Fukuyama & Jaschhof, 4 males, no. A0881-A0884; same locality, but 26 July-16 Aug. 1999, 1 male, no. A0887; same locality, but 16 Aug-13 Sept. 1999, 2 males, no. A0885-A0886; Hn: Ao, Towadako Town, Tsuta hot spring, 25 June 1999, leg. Jaschhof, 1 male, no. A0878; same locality, but 25 June-28 July 1999, 1 male, no. A0879; Ak, Kazuno City, Goshogake Mts., Mt. Yakeyama, 21 June 1999, leg. Jaschhof, 1 male, no. A0471; Iw, Tamayama Village, Koma, 26 May-15 June 1999, leg. Gotoh, 1 male, no. A0880; Hy, Mt. Hyonosen, 28 Sept. 1995, leg. Jaschhof & Yagi, 1 male, no. A0447.

***Peromyia montivaga* sp. n.**

(Figs. 39A-C)

Male. Body size: 0.9-1.0 mm.

Head: Postfrons non-setose. Eye bridge 1-2 facets long laterally and 2-3 facets at vertex. With 2 rows of postocular bristles (with the posterior row well developed in holotype but more sparse and irregular in paratypes). Antennae with 12 flagellomeres; terminal flagellomere constricted resulting in an almost separate 13th flagellomere. Flagellomere 4 (Fig. 39A) with neck longer than node; node with single to double whorl of short setae and scales basally, next to it with single to triple whorl of long setae, medially, just beyond setae, with whorl of long sensory hairs, distally with a few sensory spines. Palpi 4-segmented, the proximal 3 segments with fairly long sensory hairs.

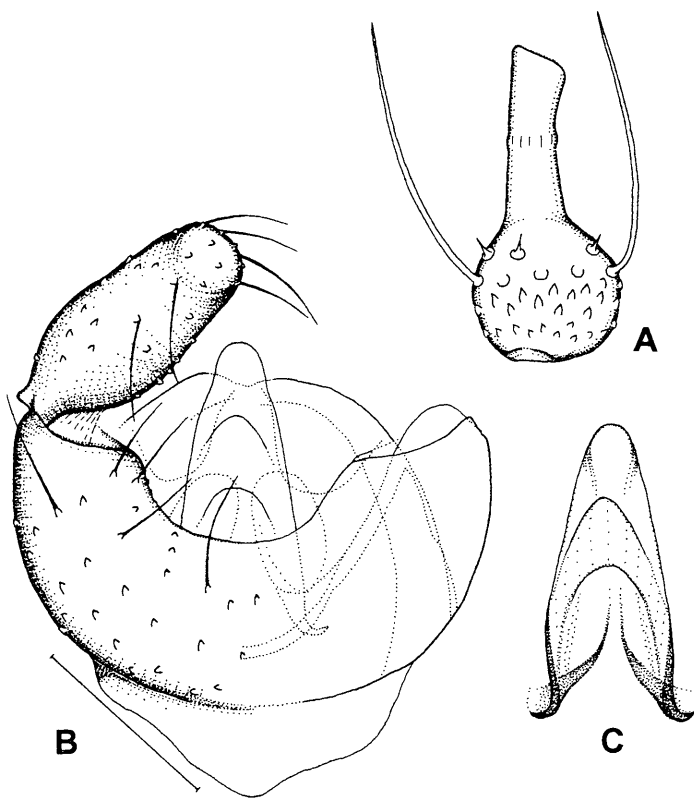
Thorax: Scutum with lateral and dorsocentral rows of setae. Empodia as long as claws. Claws without teeth. Wings: R1 = 3-3.5 rs, strong anterior portion of C extending point of intersection with R5 for 2-3 times the vein width of R5, fork of CuA very acute.

Abdomen/pattern of tergal plaques: 0 / 1 / 1 / 1 / 1 / 1 / 0 / 0.

Genitalia: Gonocoxites (Fig. 39B) covered with setae except their small, membranous central and most proximal portions, its distal margin with wide, U-shaped emargination extending to less than midlength of gonocoxites. Gonostyli (Fig. 39B) heavy, with their tips directed ventrad, almost as long as gonocoxites, parallel-sided or slightly tapered in distal half, broadly rounded apically, evenly covered with long setae. Tegmen (Fig. 39C) slender and elongate, almost evenly tapering to tip where it is rounded, with short, horseshoe-shaped ventral plate in centre that is distinct in holotype but weak in two of the paratypes. Tergite 9 forming a sclerotized semicircle with medial interruption of sclerotization, with interrupted row of setae along distal margin. Tergite 10 and sternite 10 bilobed, large, densely pubescent, tergite 10 with a very few short setae.

Female. Unknown.

Types. Holotype: male, no. A0893, Japan, Honshu, Akita Pref., Fujisato Town, Shirakami Mts., in mature deciduous forest dominated by beech (*Fagus crenata*), 850-1000 m, 23 June 1999, by sweepnet, leg. Jaschhof [in KUEC]. Paratypes: 2 males, no. A0894-A0895, Honshu, Nagano Pref., Mitake Village, Mt. Ontake, in subalpine forest dominated by fir (*Abies veitchii*) and *Tsuga diversifolia*, 2000 m, 16 Aug.-7 Sept. 1999, Malaise trap, leg. Jaschhof; 1 male, no. A0896, Honshu, Yamanashi Pref., Oyama Town, Mt. Fuji, in subalpine forest dominated by fir (*Abies veitchii*) and larch (*Larix kaempferi*), 1900 m, 4-13 June 1999, by Malaise trap, leg. Jaschhof [all in ZIMG].



Figs. 39A-C: *Peromyia montivaga* sp. n., male; A: flagellomere 4, lateral view; B: genitalia, ventral view; C: tegmen, ventral view. A-C: holotype. (Length of scale bar: 0.05 mm.)

Discussion. *Peromyia montivaga* best fits the *modesta*-group by its heavy, cylindrical gonostyli and structure of tegmen. Compared with other group members, *montivaga* is exceptional by its flagellomeral nodes having only one medial whorl of sensory hairs (other species have two whorls of sensory hairs or one distal whorl). In that character *montivaga* is readily distinguished from similar species (cf. *discreta*, *longicostalis* and *composita*, the latter belonging to the *sanguinea*-group and distinguished also by its gonostyli being more slender, shorter and tapered). The pattern of tergal plaques in *montivaga* is unusual among *Peromyia* species, but was found to be stable within the specimens studied.

Distribution and biology. Hn (Ak, Nn, Yn).

This species was found exclusively in submountainous and mountainous elevations between 850 and 2000 m a. s. l. For details of forest type, see under types. Flight period: Hn: VI, VIII(-IX?).

Etymology. The name refers to the fact that all known specimens originate from mountains (in Latin: *montivaga* = mountain-roaming).

Other material studied (1 male). Hn: Yn, Oyama Town, Mt. Fuji, 17 Aug.-6 Sept. 1999, leg. Jaschhof, 1 male, no. A1009.

Peromyia nemorum (Edwards, 1938)

Distribution and biology. New record for Japan. Hn (Hi).

The one Japanese specimen of *nemorum* was captured in a mature, mixed deciduous / coniferous forest in 1000 m a. s. l. in autumn.

Material studied (1 male). Hn: Hi, Yoshiwa Village, Mt. Kanmuri, 28 Sept.-22 Oct. 1999, leg. Jaschhof, 1 male, no. A0889.

***Peromyia ogawaensis* sp. n.**

(Figs. 40A-C)

Male. Body size: 0.9-1.0 mm.

Head: Postfrons non-setose. Eye bridge 1-2 facets long laterally and 2-3 facets at vertex. With 1 row of postocular bristles. Antennae with 12 flagellomeres; terminal flagellomere with slight constriction. Flagellomere 4 (Fig. 40A) with neck longer than node; node with single to double whorl of short setae basally, next to it with single to triple whorl of long setae, medially, just beyond setae, with ventral row of short sensory hairs, distally with dense whorl of thin sensory hairs longer than neck and with sparser whorl of stronger, long sensory hairs, additionally with a few sensory spines. Palpi 4-segmented, the proximal 3 segments with fairly long sensory hairs.

Thorax: Scutum with lateral and dorsocentral rows of setae. Empodia as long as claws. Claws at least of midlegs with 1-2 fine teeth. Wings: R1 = 2.5-3 rs, strong anterior portion of C ending at point of intersection with R5.

Abdomen/pattern of tergal plaques: 0 / 2 / 2 / 2 / 1 / 0-1 / 0 / 0.

Genitalia: Gonocoxites (Fig. 40B) covered with setae except their small, membranous central most proximal portions, its distal margin with emargination extending to less than midlength of gonocoxites. Gonostyli (Fig. 40B) heavy, parallel-sided, broadly rounded apically, sparsely covered with long setae and with 2 weak spines at midlength dorsally, with fairly dense and long hairs in distal third. Tegmen (Fig. 40C) slender and elongate, parallel-sided, tapering to tip in distal fourth, with striking dark (pigmented?) longitudinal band, with horseshoe-shaped ventral plate in centre having its proximal margin very clear. Tergite 9 forming a sclerotized semicircle with medial interruption of sclerotization, with interrupted row of setae along distal margin. Tergite 10 and sternite 10 bilobed each, large, densely pubescent, tergite 10 with a few short setae, sternite 10 sometimes with one short setae.

Female. Unknown.

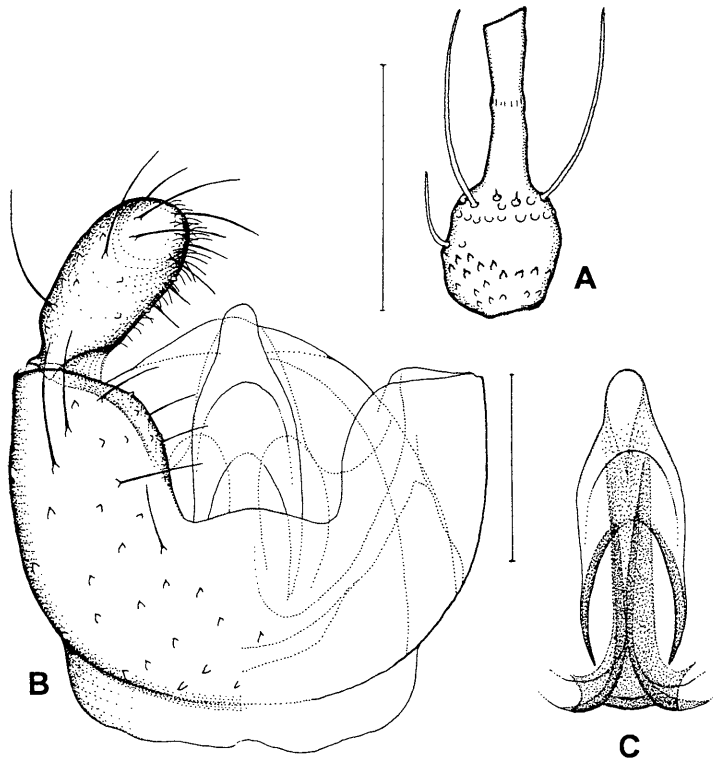
Types. Holotype: male, no. A0481, Japan, Honshu, Ibaraki Pref., Abukuma Highlands, Kitaibaraki City, Sadanami, Ogawa Forest, in secondary deciduous forest, 600 m, 14-27 May 1996, by Malaise trap, leg. Maeto [in KUEC]. Paratypes: 4 males, no. A0482-A0485, same data as holotype [all in ZIMG].

Discussion. This species is a typical representative of the *modesta*-group by its fairly big size, heavy, cylindrical gonostyli and the tegmen with well-developed ventral plate. Within this species group, *ogawaensis* is unique in having its flagellomeres with two and a half whorls of sensory hairs (in other species with maximally two whorls). Among species with evenly cylindrical gonostyli, *ogawaensis* is distinguished by its tegmen with a dark (pigmented?) longitudinal band and by its gonostyli having two spines.

Distribution and biology. Hn (Ak, Ib, Yn), Ku (Kt, Km).

Specimens of *ogawaensis* were captured in various forest types, such as subalpine, deciduous (with and without beech), and evergreen broad-leaved, up to 2000 m a. s. l. One specimen was captured in a plantation of sugi (*Cryptomeria japonica*) mixed with deciduous trees. Flight period: Hn: V-VI; Ku: IV, IX-X.

Etymology. The name is derived from the type locality, Ogawa, a village and research forest with identical name, that has proven one of the most diverse forests in Japan in respect to its lestremiine fauna.



Figs. 40A-C: *Peromyia ogawaensis* sp. n., male; A: flagellomere 4, lateral view (0.1 mm); B: genitalia, ventral view (0.05 mm); C: tegmen, ventral view (0.05 mm). A-C: holotype. (In parentheses: length of scale bar.)

Other material studied (24 males). Hn: same data as types, 1 male, no. A1401; same data, but Ogawa Research Forest, 3 May 1999, leg. Jaschhof, 2 males, no. A0486-A0487; same data, but 18 April-3 May 1999, 6 males, no. A1365-A1370; same data, but 3-11 May 1999, 3 males, no. A1380-A1382; same data, but 11 May-1 June 1999, 3 males, no. A1455-A1456, A1507; Ib, Mt. Tsukuba, 12 May 1999, leg. Jaschhof, 2 males, no. A1120-A1121; Yn, Oyama Town, Mt. Fuji, 4-13 June 1999, leg. Jaschhof, 1 male, no. A0890; Ak, Kazuno City, Goshogake Mts., Mt. Yakeyama, 21 June 1999, leg. Jaschhof, 1 male, no. A0488; Ku: Kt, Kumamoto City, Tatsudayama Experimental Forest, 17 Sept.-17 Oct. 1999, leg. Ito, 3 males, no. A1122-A1124; Km, Kagoshima City, Iso, 30 April 1968, leg. Yukawa, 1 male; Km, Mt. Kinpou, 18 Sept. 1995, leg. Jaschhof, 1 male, no. A0489.

***Peromyia tsukubasanensis* sp. n.**
(Figs. 41A-C)

Male. Body size: 1.2 mm.

Head: Postfrons setose. Eye bridge 2-3 facets long laterally and 3-4 facets at vertex. With 1 sparse row of postocular bristles. Antennal flagellum with 12 flagellomeres; terminal flagellomere constricted resulting in small additional node. Flagellomere 4 (Fig. 41A) with neck longer than node; node with single to double whorl of short setae basally, next to it with single to double whorl of long setae, subdistally with whorl of fine, long sensory hairs, distally with a few stronger, long sensory hairs and sensory

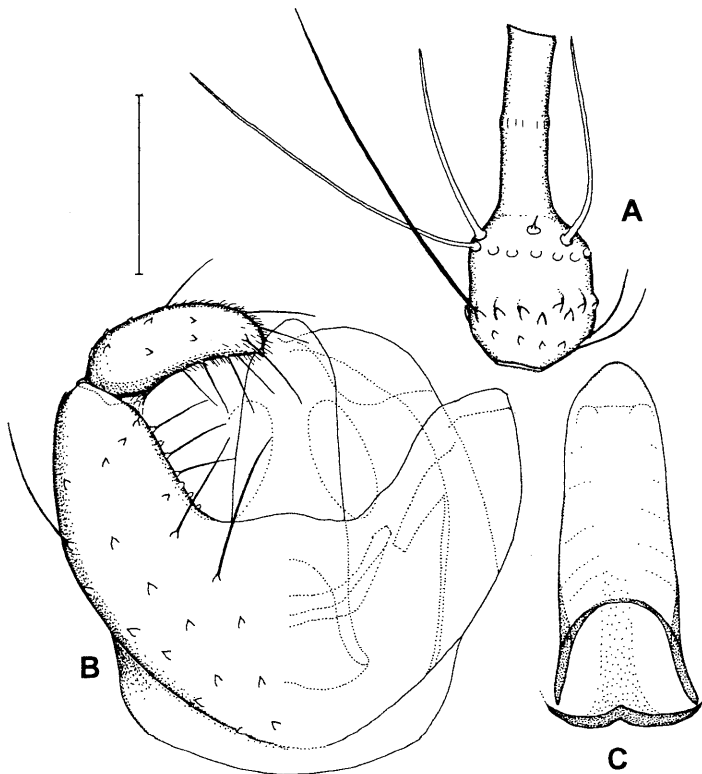
spines. Palpi short, 3-segmented, first segment swollen with the second segment inserted subterminally, also second segment with a few sensory hairs, third segment slender and pointed.

Thorax: Long and flat in that katepisternum rounded ventrally (not triangular as usual) and postphragma unusually long. Scutum with lateral and dorsocentral rows of setae. Empodia as long as claws. Claws of midlegs with 1-2 fine teeth. Wings: $R_1 = 3.5 rs$, strong anterior portion of C ending at point of intersection with R_5 .

Abdomen/pattern of tergal plaques: 0/2/2/2/1/0/0/0.

Genitalia: Gonocoxites (Fig. 41B) covered with setae ventrally except their small membranous central and most proximal portions, its distal margin with wide emargination extending to less than midlength of gonocoxites. Gonostyli (Fig. 41B) slender, elongate, a little tapering to tip, slightly curved inwards and excavated inside, covered with long setae elsewhere and with dense, short hairs in distal half. Tegmen (Fig. 41C) heavy and long, slightly tapering to tip, with rounded distal margin, with strongly sclerotized rib dorsoproximally, with ventral plate visible only by its sclerotized, horseshoe-shaped proximal margin. Tergite 9 forming a sclerotized semicircle with medial interruption of sclerotization, with irregular, interrupted row of setae along distal margin. Tergite 10 bilobed, densely pubescent and with short setae. Sternite 10 bilobed, densely pubescent.

Female. Unknown.



Figs. 41A-C: *Peromyia tsukubasanensis* sp. n., male; A: flagellomere 4, lateral view; B: genitalia, ventral view; C: tegmen, ventral view. A-C: holotype. (Length of scale bar: 0.05 mm.)

Types. Holotype: male, no. A1161, Japan, Honshu, Ibaraki Pref., Mt. Tsukuba, in mixed deciduous forest with a few conifers, 550 m, 12 May 1999, by exhaustor, leg. Jaschhof [in KUEC]. Paratypes: 2 males, no. A1162-A1163, same data as holotype [all in ZIMG].

Discussion. Within *Peromyia*, this species is unique by its unusual structure of thorax and its palpi having the basal segment swollen. *Peromyia tsukubasanensis* is tentatively classified into the *modesta*-group by characters of its male genitalia.

Distribution and biology. Hn (Ib).

For details of habitat and flight period, see under types.

Etymology. The name is derived from the type-locality, Mt. Tsukuba, in Japanese called Tsukuba-san.

Peromyia vernalis sp. n.

(Figs. 42A-E)

Male. Body size: 1.2 mm.

Head: Postfrons non-setose. Eye bridge 1-2 facets long laterally and 2-3 facets at vertex. With 2 rows of postocular bristles with the posterior row of half to full length of the anterior row. Antennal flagellum with 12 flagellomeres; terminal flagellomere constricted resulting in small additional node; first flagellomere with irregular whorl of short sensory hairs basally that is absent on the following flagellomeres. Flagellomere 4 (Fig. 42A) with neck longer than node; node with single to double whorl of short setae basally, next to it with single to double whorl of long setae, medially with whorl of short sensory hairs, distally with whorl of strong, long sensory hairs and additionally a few short, fine sensory hairs and sensory spines. Palpi 4-segmented, also second segment with a few sensory hairs, terminal segment as long or longer than third.

Thorax: Scutum with lateral and dorsocentral rows of setae. Empodia as long as claws. Claws without teeth. Wings: R1 = 3.5-4 rs, strong anterior portion of C extending point of intersection with R5 for once the vein width of R5.

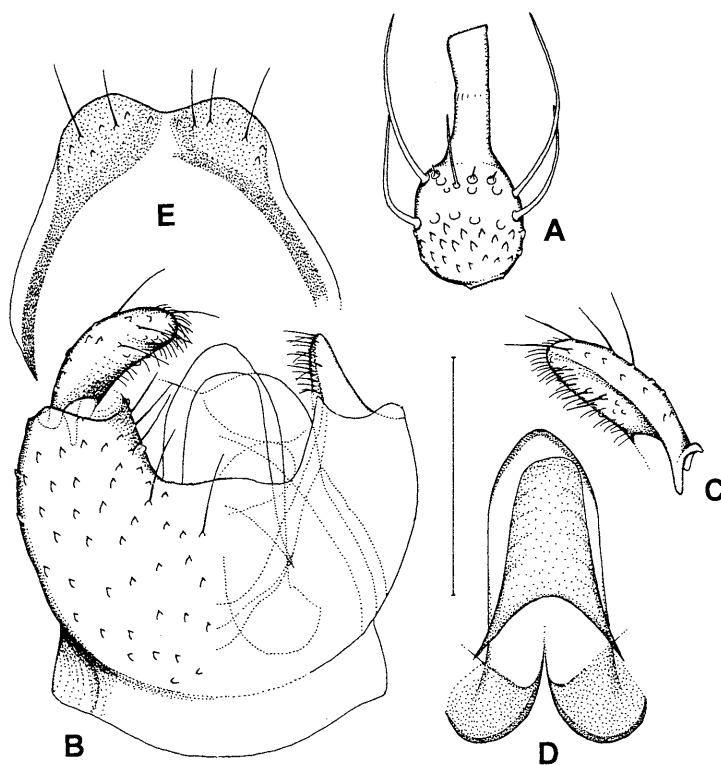
Abdomen/pattern of tergal plaques: 0 / 2 / 2 / 2 / 1 / 1 / 0 / 0.

Genitalia: Gonocoxites (Fig. 42B) covered with setae ventrally except its small membranous portion below the emargination and a large portion most proximally, its distal margin with almost rectangular emargination extending to less than midlength of gonocoxites, dorsally with lobes tapering to tip and having a few fine setae and dense hairs inside. Gonostyli (Figs. 42B, C) slender, elongate, slightly curved inwards, a little flattened, covered with setae elsewhere and with dense, fairly long hairs inside and apically, with 3 short spines inside just beyond midlength of gonostyli. Tegmen (Fig. 41D) heavy, almost parallel-sided, with rounded distal margin, its ventral plate weakly sclerotized, with distinct, rounded proximal and cut distal margins. Tergite 9 fairly long and extensively sclerotized, with 2 distolateral, rounded lobes having a group of long setae each, its distal margin somewhat emarginated and membranous medially. Tergite 10 bilobed, densely pubescent and with short setae. Sternite 10 bilobed, densely pubescent.

Female. Unknown.

Types. Holotype: male, no. A1393, Japan, Honshu, Ibaraki Pref., Kitaibaraki City, Sadanami, Ogawa Research Forest, in mature, mixed deciduous forest dominated by beech (*Fagus crenata*), 600 m, 3-11 May 1999, by Malaise trap, leg. Jaschhof [in KUEC]. Paratypes: 2 males, no. A1394-A1395, same data as holotype; 2 males, no. A1396-A1397, same locality, but 18 April-3 May 1999 [all in ZIMG].

Discussion. This new species is extremely similar to *P. suberis* Jasch. described from southern Spain. *Peromyia vernalis* may be distinguished from the latter by the following characters (in parentheses: *suberis*): head with two rows of postocular bristles (with one



Figs. 42A-E: *Peromyia vernalis* sp. n., male; A: flagellomere 4, lateral view; B: genitalia, ventral view; C: gonostylus, dorsal view; D: tegmen, ventral view; E: tergite 9, dorsal view. A, B, D, E: holotype, C: paratype. (Length of scale bar: 0.01 mm.)

row); male genitalia having the gonostyli more slender, with longer basolateral apophysis, longer and denser hairs inside and apically and the three inner spines inserted close to midlength rather than in distal third; tegmen with its ventral plate having a distinct, rounded proximal margin (proximal margin indistinct); tergite 9 long through the presence of two distolateral, rounded lobes (short and without lobes). *Peromyia ampla* is also similar to *vernalis* in having the gonostyli flattened, but, for example, it lacks the dorsodistal gonocoxal lobes that are present in *vernalis* and vestiture on the antennal flagellomeres differs in the two species.

Distribution and biology. Hn (Ib).

For details of habitat and flight period, see under types.

Etymology. The name refers to the period of collecting of the type material (in Latin: *vernalis* = belonging to spring).

Peromyia ornata-group

The group is named for *Peromyia ornata* described below. Species of this group are distinct in having their male genitalia with the gonocoxites with distolateral, setose lobes, the gonostyli flattened with a dorsoproximal lobe that may be tooth-like, and the tegmen with loop-like, membranous structures distolaterally. All these are unquestionably derived characters.

Group members are known exclusively from Japan. Four species are here described as new to science.

Peromyia austrina sp. n.
(Figs. 43A-D)

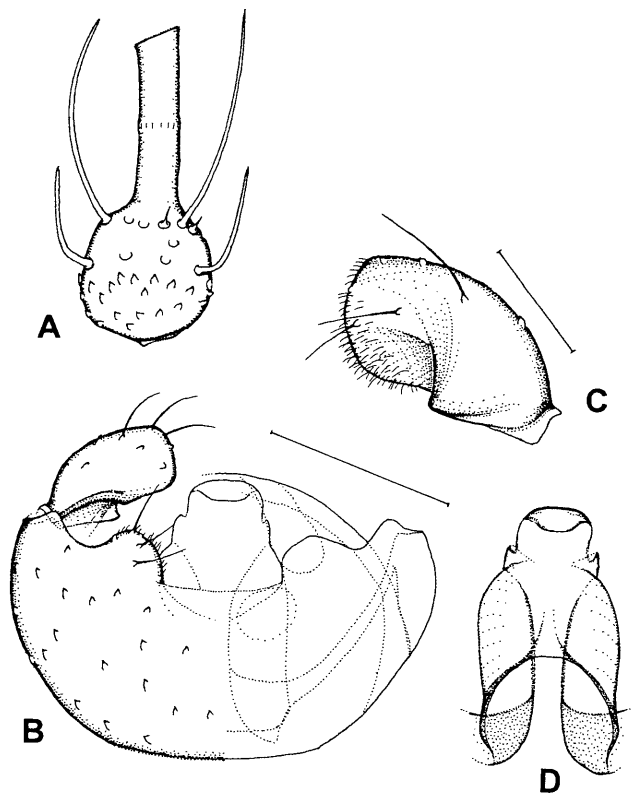
Male. Body size: 0.7 mm.

Head: Postfrons non-setose. Eye bridge 1-2 facets long laterally and 2-3 facets at vertex. With 1 row of postocular bristles. Antennal flagellum with 12 flagellomeres; terminal flagellomere constricted. Flagellomere 4 (Fig. 43A) with neck longer than node; node with single to double whorl of short setae and scales basally, next to it with double to triple whorl of long setae, medially, just beyond setae, with irregular whorl of short sensory hairs, distally with irregular whorl of long sensory hairs, additionally with a few sensory spines. Palpi 4-segmented, also second segment with a few sensory hairs.

Thorax: Scutum with sparse lateral and dorsocentral rows of setae. Empodia as long as claws. Claws of midlegs with 1-2 minute teeth. Wings: R1 = 2.5-3 rs, strong anterior portion of C extending point of intersection with R5 for once the vein width of R5.

Abdomen: Pattern of tergal plaques uncertain.

Genitalia: Gonocoxites (Fig. 43B) wide but short, covered with long setae ventrally, its distal margin with shallow, U-shaped emargination extending to less than midlength of gonocoxites, on either side of emargination with thick swelling densely covered with short setae, dorsal transverse bridge wide. Gonostyli (Figs. 43B, C) flattened when seen



Figs. 43A-D: *Peromyia austrina* sp. n., male; A: flagellomere 4, lateral view (0.05 mm); B: genitalia, ventral view (0.05 mm); C: gonostylus, dorsal view (0.02 mm); D: tegmen, ventral view (0.05 mm). A-D: holotype. (In parentheses: length of scale bar.)

from above and rather stout in ventral view, setose outside and with dense cover of hairs inside, dorsoproximally with almost triangular lobe with fine pubescence. Tegmen (Fig. 43D) heavy, widest near midlength and becoming narrower distally, distal margin cut and with lip-like structure directed ventrad, with loop-like membranous structures distolaterally, with ventral plate having sclerotized, U-shaped proximal margin and a longitudinal sclerotization, distal margin of ventral plate not visible. Tergite 9 short and wide, forming a sclerotized semicircle with medial interruption of sclerotization, with uninterrupted row of setae along distal margin. Tergite 10, bilobed, densely pubescent and with a few short setae. Sternite 10 very weak, bilobed, poorly pubescent.

Female. Unknown.

Types. Holotype: male, no. A1102, Japan, Kyushu, Aya Town, Aya Research Forest, in mature, evergreen broad-leaved forest, 400-600 m, 5-20 Oct. 1999, by Malaise trap, leg. Jaschhof [in KUEC]. Paratypes: 2 males, no. A1103-A1104, same data as holotype [in ZIMG].

Discussion. Within the *ornata*-group, this new species is most similar to *obesa* (see below, characters in parentheses) and distinguished from the latter as follows: gonostyli with bare, tooth-like lobe (with triangular, pubescent lobe), tegmen narrower distally than proximally (wider distally than proximally), gonocoxites with emargination extending to midlength of gonocoxites (emargination not extending as far as midlength).

Distribution and biology. Ku (Mz).

For details of habitat and flight period, see under types.

Etymology. The name is a Latin adjective meaning "southern", referring to the southern Japanese origin of the type-material.

***Peromyia obesa* sp. n.**

(Figs. 44A-D)

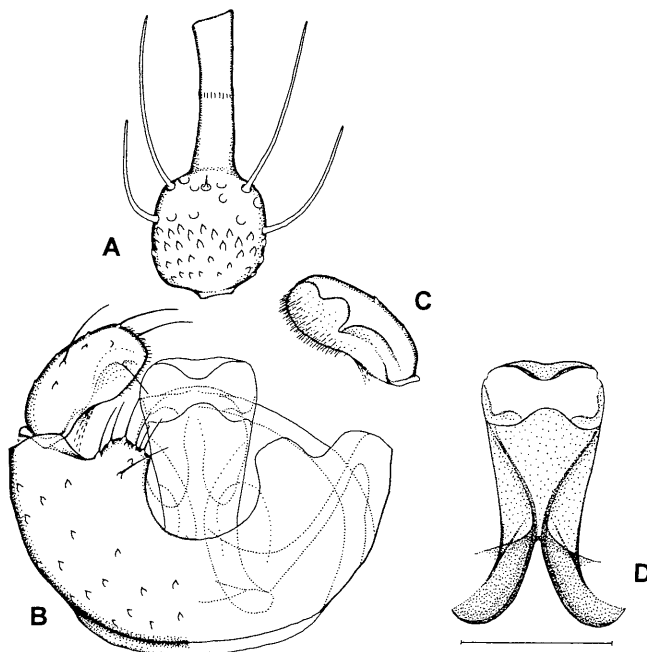
Male. Body size: 0.8 mm.

Head: Postfrons non-setose. Eye bridge 2-3 facets long laterally and 3 facets at vertex. With 1 row of postocular bristles. Antennal flagellum broken in specimens available with maximally 8 flagellomeres remaining. Flagellomere 4 (Fig. 44A) with neck longer than node; node with single to double whorl of short setae basally, next to it with double to triple whorl of long setae, medially, just beyond setae, with irregular whorl of short sensory hairs, distally with irregular whorl of long sensory hairs, additionally with a few sensory spines. Palpi 4-segmented, also segment 2 with a few sensory hairs.

Thorax: Scutum with lateral and dorsocentral rows of setae. Empodia as long as claws. Claws with 1-2 minute teeth. Wings: R1 = 2.5-3 rs, strong anterior portion of C extending point of intersection with R5 for once the vein width of R5.

Abdomen/pattern of tergal plaques: 0 / 2 / 2 / 2 / 1 / 0 / 0 / 0.

Genitalia: Gonocoxites (Fig. 44B) wide but short, covered with very long setae ventrally, its distal margin with semicircular emargination extending to midlength of gonocoxites, on either side of emargination with thick swelling densely covered with short setae, dorsal transverse bridge wide. Gonostyli (Figs. 44B, C) flattened when seen from above, setose outside and with dense cover of short hairs inside, dorsoproximally with bare lobe (thus looking like a tooth-like structure) that is most conspicuous by its distal margin appearing to be a pointed process. Tegmen (Fig. 44D) huge, widest distally, its distal margin cut and with lip-like structure directed ventrad, with loop-like membranous structure in distal fourth, its ventral plate (?) extending to 3/4 of tegmen length and having a sinusoidal distal margin and weak, U-shaped proximal margin. Tergite 9 short and wide, forming a sclerotized semicircle with medial interruption of sclerotization, with interrupted row of setae along distal margin. Tergite 10 with strikingly sharp contours, elongate, bilobed, densely pubescent and with a few short setae.



Figs. 44A-D: *Peromyia obesa* sp. n., male; A: flagellomere 4, ventrolateral view; B: genitalia, ventral view; C: gonostylus, dorsal view; D: tegmen, ventral view. A-D: holotype. (Length of scale bar: 0.05 mm.)

Sternite 10 very weak, bilobed, pubescent.

Female. Unknown.

Types. Holotype: male, no. A0602, Japan, Hokkaido, Iburi Sub-Pref., Tomakomai City, Hokkaido University Experimental Forest, in mature, mixed deciduous forest, 100 m, 30 June-26 July 1999, by Malaise trap, leg. Jaschhof [in KUEC]. Paratype: 1 male, no. A0603, Hokkaido, Ishikari Sub-Pref., Chitose City, 5 km E Lake Shikotsuko, in mixed deciduous / coniferous forest, ca. 300 m, 24 July 1999, by exhaustor, leg. Jaschhof [in ZIMG].

Discussion. Within the *ornata*-group, *obesa* is most similar to *P. austrina* (for differences, see under the latter). It is easily distinguished from all other group members in that its tegmen is wider terminally than subbasally.

Distribution and biology. Hk (Ir, Iu).

Specimens of *obesa* were collected in various deciduous forests (sometimes mixed with conifers) exclusively in Hokkaido. Flight period: Hk: VII-VIII.

Etymology. The name is a Latin adjective meaning "swollen", referring to the thick gonocoxal lobes in this species.

Other material studied (3 males). Hk: Ir, Sapporo City, Toyohira, 29 June-26 July 1999, leg. Fukuyama & Jaschhof, 2 males, no. A1099-A1100; same locality, but 26 July-16 Aug. 1999, 1 male, no. A1101.

***Peromyia ornata* sp. n.**

(Figs. 45A-E)

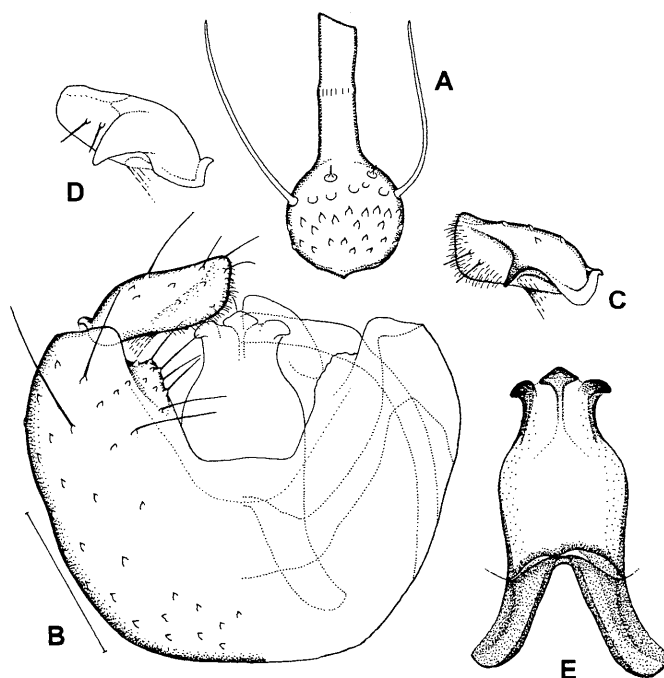
Male. Body size: 0.9-1.0 mm.

Head: Postfrons non-setose. Eye bridge 1-2 facets long laterally and 2-3 facets at vertex. With 1 row of postocular bristles. Antennal flagellum with 12 flagellomeres; terminal flagellomere constricted resulting in indistinct additional node. Flagellomere 4 (Fig. 45A) with neck longer than node; node with single to double whorl of short setae basally, next to it with double to triple whorl of long setae, medially / distally with whorl of long sensory hairs, additionally with a few sensory spines and short, fine sensory hairs distally. Palpi 4-segmented, also segment 2 with single sensory hairs.

Thorax: Scutum with lateral and dorsocentral rows of setae. Empodia as long as claws. Claws with 2-3 minute teeth. Wings: $R_1 = 2.5-3\text{ rs}$, strong anterior portion of C extending point of intersection with R5 for just once the vein width of R5.

Abdomen/pattern of tergal plaques: 0 / 2 / 2 / 2 / 1 / 1 / 1 / 0.

Genitalia: Gonocoxites (Fig. 45B) heavy, covered with setae ventrally except its central portion, its distal margin with U-shaped emargination extending to less than midlength of gonocoxites, emargination surrounded by weakly membranous, non-setose zone, on either side of emargination with setose lobe. Gonostyli (Figs. 45B-D) flattened when seen from above, setose outside, inside with dense cover of short hairs and 2 weak spines subapically, dorsally with sclerotized, pointed, tooth-like structure. Tegmen (Fig. 45E) heavy, widest and sclerotized basally, its distal margin with lip-like (?) structure in centre and short, horn-like, sclerotized processes on either side, with ventral plate visible by its proximal margin that is more or less clearly sclerotized and with longitudinal sclerotization sometimes. Tergite 9 short and wide, forming a sclerotized semicircle, distal margin almost straight, with uninterrupted row of setae along distal margin. Tergite 10 with sharp contours, elongate, bilobed, densely pubescent and with a few short setae. Sternite 10 obviously lacking.



Figs. 45A-E: *Peromyia ornata* sp. n., male; A: flagellomere 4, lateral view; B: genitalia, ventral view; C, D: gonostylus, dorsal view; E: tegmen, ventral view. A-C, E: holotype, D: specimen from Iwate Pref. (Length of scale bar: 0.05 mm.)

Female. Unknown.

Types. Holotype: male, no. A0608, Japan, Hokkaido, Iburi Sub-Pref., Tomakomai City, Hokkaido University Experimental Forest, in mature, mixed deciduous forest, 100 m, 30 June-26 July 1999, by Malaise trap, leg. Jaschhof [in KUEC]. Paratype: 1 male, no. A0609, Ryukyu Islands, Okinawa Pref., Iriomote Island, Funaura, in evergreen broad-leaved forest, 5-6 October 1995, by exhaustor, leg. Jaschhof [in ZIMG].

Discussion. *Peromyia ornata* is readily distinguished from other group members by its male genitalia with heavy gonocoxites, its gonostyli having a strongly sclerotized, pointed tooth dorsally, and the tegmen having horn-like processes distolaterally. Additionally, it is the only species of this group that has the flagellomeres with only one whorl of sensory hairs (two whorls in other species).

Distribution and biology. Hk (Iu), Hn (Iw), Ry-Ow.

The few specimens known were captured in deciduous and evergreen broad-leaved forests. Flight period: Hk: VII; Hn: VI; Ry: X.

Etymology. The name is a Latin adjective meaning "decorated", referring to the modified genitalic structures in this species.

Other material studied (2 males). Hn: Iw, Tamayama Village, Koma, 15 June-4 July 1999, leg. Gotoh, 2 males, no. A1092-A1093.

***Peromyia ryukyuensis* sp. n.**

(Figs. 46A-D)

Male. Body size: 0.8 mm.

Head: Postfrons non-setose. Eye bridge 1-2 facets long laterally and 2-3 facets at vertex. With 1 row of postocular bristles. Antennal flagellum broken in specimens available with maximally 6 flagellomeres remaining. Flagellomere 4 (Fig. 46A) with neck longer than node; node with single to double whorl of short setae basally, next to it with double to triple whorl of long setae, medially, just beyond setae, with irregular whorl of sensory hairs variable in length, distally with irregular whorl of long sensory hairs, additionally with a few sensory spines. Palpi 4-segmented, all segments except terminal with fairly long sensory hairs.

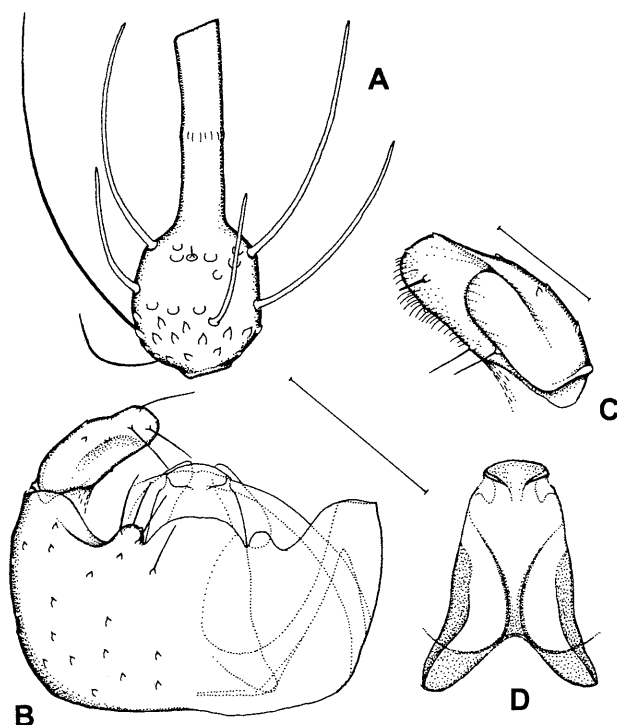
Thorax: Scutum with lateral and dorsocentral rows of setae. Empodia as long as claws. Claws with 1-2 minute teeth. Wings: R1 = 2.5-3 rs, strong anterior portion of C extending point of intersection with R5 for once the vein width of R5.

Abdomen: Pattern of tergal plaques uncertain.

Genitalia: Gonocoxites (Fig. 46B) covered with setae ventrally, its distal margin without emargination but with pubescent membrane centrally, on either side of this membranous portion with small setose swelling, dorsal transverse bridge fairly wide. Gonostyli (Figs. 46B, C) flattened when seen from above, setose outside, inside with dense cover of hairs and 1 subapical spine and a group of spine-like setae subbasally, with dorsal lobe having a weak but large, rounded, tooth-like structure. Tegmen (Fig. 46D) heavy, widest basally and slightly tapering to tip, its distal margin rounded, ventroapically with indistinct lip-like and subapically with loop-like, membranous structures, ventral plate obviously absent. Tergite 9 short and wide, forming a sclerotized semicircle with medial interruption of sclerotization, with uninterrupted row of setae along distal margin. Tergite 10 elongate, bilobed, densely pubescent and with a few short setae. Sternite 10 obviously absent.

Female. Unknown.

Types. Holotype: male, no. A0604, Japan, Ryukyu Islands, Okinawa Pref., Okinawa, Yabbaru Peninsula, Yona Village, in mature, evergreen broad-leaved forest, 18 March 1999, by sweepnet, leg. Jaschhof [in KUEC]. Paratypes: 2 males, no. A0605-A0606,



Figs. 46A-D: *Peromyia ryukyuensis* sp. n., male; A: flagellomere 4, lateral view (0.05 mm); B: genitalia, ventral view (0.05 mm); C: gonostylus, dorsal view (0.02 mm); D: tegmen, ventral view (0.05 mm). A: paratype from Iriomote, B-D: holotype. (In parentheses: length of scale bar.)

Ryukyu Islands, Kagoshima Pref., Amami Oshima, Kawauchi Village, Kamiya Forest, in evergreen broad-leaved forest, 26 March 1999, by exhaustor, leg. Jaschhof; 1 male, no. A0607, Ryukyu Islands, Okinawa Pref., Iriomote Island, in mature, evergreen broad-leaved forest, 8 March 1999, by exhaustor, leg. Jaschhof [all in ZIMG].

Discussion. Within the *ornata*-group, *ryukyuensis* is characterized by its gonocoxites lacking a ventrodistal emargination and its tegmen lacking a ventral plate.

Distribution and biology. Ry-Km, Ry-Ow.

For details of habitat, see under types. Flight period: Ry: III.

Etymology. The name refers to the Ryukyu Islands where the type-material originates from.

Peromyia palustris-group

Diagnosis as in Jaschhof (1998: 471). Six of at least eight species that belong to this group and occur in Japan are treated here. One of these species is described as new to science. Several taxonomic units that I consider species have been argued by other authors to comprise more than one species. Persistent difficulties in distinguishing between *Peromyia* species are particularly well reflected in this species group. The study of Japanese specimens of *Peromyia palustris* resulted in finding eight or nine different morphotypes. The description and interpretation of this *palustris*-complex will be subject of a separate paper (Jaschhof in prep.).

Peromyia fungicola (Kieffer, 1901)

(Fig. 47)

Supplement to description. Male.

Abdomen/pattern of tergal plaques: 0 / 2 / 2 / 2 / 2 / 1 / 0 / 0.

Discussion. *Peromyia fungicola* has been known to be variable both within Japan (cf. Yukawa 1971: 26) and other parts of the Holarctic (cf. Jaschhof 1998: 474 ff., Fig. 218b). Japanese specimens of *fungicola* have their gonostyli usually with a rather short, straight apical tooth, but those with short, slightly curved, or long, strongly curved tooth occur as well. The neotype specimen of *fungicola* has its gonostyli with long, curved apical tooth (Fig. 47). In this specimen, the tip of tegmen is swept dorsad, resulting in an artificial lip-like structure.

Distribution and biology. Hk (Kk, Ir), Hn (Ak, Ib, Tc, Nn, Ky, Hy, Hi), Sh (Ko), Ku (Fu, Kt, Mz).

Specimens of *fungicola* were captured in all main types of natural Japanese forest, from northern subalpine to southern evergreen broad-leaved, in elevations up to 1200 m a. s. l. Other specimens were taken over rotting oak logs for mushroom (shiitake) cultivation and were trapped in a plantation of sugi (*Cryptomeria japonica*) mixed with deciduous trees. Flight period: Hk: VII-IX; Hn: IV-X; Sh: XI; Ku: V, X-XI.

Material studied (47 males, 1 female). Hk: Kk, Furano City, Rokugo Village, Tokyo University Experimental Forest, 5-23 July 1999, leg. Jaschhof, 6 males, no. A1206-A1211; Ir, Sapporo City, Toyohira, 29 June-26 July 1999, leg. Fukuyama & Jaschhof, 1 male, no. A1212; same locality, but 16 Aug.-13 Sept. 1999, 2 males, no. A1213-A1214; Hn: Ak, Minehama Village, Shirakami Mts., Mizusawa River Valley, 22 June 1999, leg. Jaschhof, 1 male, no. A0587; Ib, Kitaibaraki City, Sadanami, Ogawa Forest, 9-25 July

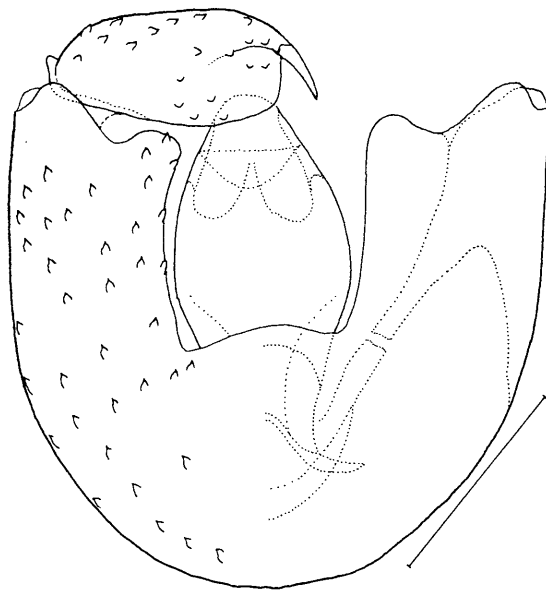


Fig. 47: *Peromyia fungicola* (Kieffer, 1901), neotype male; genitalia, ventral view, right gonostylus and tergites 9, 10 and sternite 10 omitted. (Length of scale bar: 0.05 mm.)

1996, leg. Maeto, 5 males, no. A0104-A0108; same data, but 6-20 Aug. 1996, 3 males, no. A0588-A0590; same data, but 14-27 May 1996, 6 males, no. A0591-A0593, A1398-A1400; same data, but Ogawa Research Forest, 18 April-3 May 1999, leg. Jaschhof, 1 male, no. A1371; same data, but 11 May-1 June 1999, 6 males, no. A1462-A1467; Tc, Okunikko, Marunuma Lake, 2 June 1968, leg. Yukawa, 1 male; Nn, Kiso Village, Mizukisawa Forest, 16 Aug.-6 Sept. 1999, leg. Jaschhof, 1 male, no. A1215; Ky, Kyoto City, Fushimi, Momoyama, 10 May-9 June 1999, leg. Fujita, 1 male, no. A1216; Kyoto City, Kuta Research Forest, 22 Sept.-24 Oct. 1999, leg. Jaschhof, 3 males, no. A1217-A1219; Hy, Mt. Hyonosen, 28 Sept. 1995, leg. Jaschhof & Yagi, 3 males, no. A0100-A0102; Sh: Ko, Kochi City, Asakura, 4-11 Nov. 1998, leg. Jaschhof, 2 males, 1 female, no. A0594-A0596; Ku: Mz, Aya Town, Aya Research Forest, 5-20 Oct. 1999, leg. Jaschhof, 1 male, no. A1220; Morotsuka Village, 16 Oct. 1999, leg. Jaschhof, 2 males, no. A1221-A1222; Lake Miike, 21 May 2000, leg. Jaschhof, 1 male, no. A1223; Km, Aso, 12 and 14 Oct. 1995, leg. Jaschhof, 1 male, no. A0103.

Remark. The original description of *Peromyia fungicola* was published in Bull. soc. hist. nat. Metz (2), 21: 37-38 (not Bull. soc. hist. nat. Metz (2), 8: 48, as stated by Jaschhof (1998: 473)).

***Peromyia lobuscorum* sp. n.**
(Fig. 48A-C)

Diagnosis and Discussion. *Peromyia lobuscorum* is extremely similar to *P. muscorum* in almost all its characters and there is only one striking difference between the two species which lies in the structure of gonostyli. These have a distinct lobe with fairly long, rough hairs inside in *lobuscorum*, while they are only slightly bulbous with short, fine hairs in *muscorum* (cf. Jaschhof 1998: 477, Fig. 219b). In *lobuscorum*, the inner gonostylar lobe is clearly set off against and emphasizes the narrow tip of gonostyli (Figs. 48A, B). Additionally, the tegmen in *lobuscorum* tends to be parallel-sided rather than widened and a little rounded distally as found in *muscorum* (cf. Jaschhof l. c.: 477, Fig. 219c) and its ventral plate is longer than wide (as long as wide or shorter in

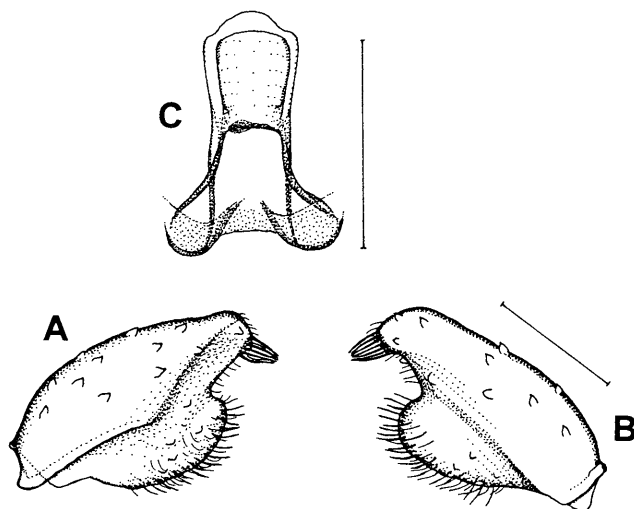


Fig. 48A-C: *Peromyia lobuscorum* sp. n., male; A: gonostylus, ventral view (0.02 mm); B: dito, dorsal view (0.02 mm); C: tegmen, ventral view (0.05 mm). A, B: holotype, C: paratype from Nagano Pref.

muscorum).

The female of *lobuscorum* is unknown.

Types. Holotype: male, no. A0586, Japan, Honshu, Aomori Pref., Towadako Town, Tsuta hot spring, in mature, mixed deciduous forest dominated by beech (*Fagus crenata*), 500-600 m, 28 July 1999, by sweepnet, leg. Jaschhof [in KUEC]. Paratypes: 1 male, no. A0585, same data as holotype; 1 male, no. A1327, same locality, but 25 June-28 July 1999, by Malaise trap; 1 male, no. A0565, Hokkaido, Hidaka Sub-Pref., Hidaka Town, Hidaka Mts., in subalpine forest dominated by fir (*Abies sachalinensis*), 400-500 m, 3 July 1999, by sweepnet, leg. Jaschhof; 1 male, no. A0580, Hokkaido, Iburi Sub-Pref., Tomakomai City, Hokkaido University Experimental Forest, in mature, mixed deciduous forest, 100 m, 30 June-26 July 1999, by Malaise trap, leg. Jaschhof; 1 male, no. A0562, Honshu, Ibaraki Pref., Kitaibaraki City, Sadanami, Ogawa Forest, in secondary, mixed deciduous forest, 600 m, 6-20 Aug. 1996, by Malaise trap, leg. Maeto; 1 male, no. A1413, Honshu, Nagano Pref., Azumi Village, Norikurakogen, in secondary, mixed deciduous forest, 1550 m, 14 July 2000, by sweepnet, leg. Jaschhof [all in ZIMG].

Distribution and biology. Hk (Hd, Iu), Hn (Ao, Ib, Nn).

This new species was captured in subalpine and deciduous (within and north of the beech zone) forest up to 1550 m a. s. l. Flight period: Hk: VII; Hn: VII-VIII.

Etymology. The name is composed of the Latin "lobatus" (= lobed) and the species epithet of *Peromyia muscorum* which is very similar to the here described species.

Peromyia muscorum (Kieffer, 1895)

Supplement to description. Male.

Abdomen/pattern of tergal plaques: 0 / 2 / 2 / 2 / 1 / 1 / 0 / 0.

Distribution and biology. New record for Japan. Hk (So, Kk, Sr, Ir, Iu), Hn (Ao, Iw, Ib, Nn, Yn, Ky), Sh (Ko), Ku (Ns, Mz), Ry-Ow, Bo-To.

Peromyia muscorum is one of the most common lestremiine species in Japanese forests, sometimes tending towards mass development. The species is widespread and inhabits all types of natural forest in Japan from lowland up to 2000 m a. s. l. Further, several specimens were captured twice over oak logs for mushroom (shiitake) cultivation. Flight period: Hk: VII-VIII; Hn: VI-X; Sh: VI; Ku: X; Ry: III, V; Bo: X-XI.

Material studied (112 males). Hk: So, Rishiri Island, Rishiri Town, 13 July 1999, leg. Jaschhof, 1 male, no. A0564; Kk, Furano City, Rokugo Village, Tokyo University Experimental Forest, 23 July 1999, leg. Jaschhof, 2 males, no. A0566-A0567; same locality, but 5-23 July 1999, 5 males, no. A1301-A1305; Ootoinneppu Town, Hokkaido University Experimental Forest, 8-16 July 1999, leg. Jaschhof, 2 males, no. A1306-A1307; Higashikawa Town, Ishikari Mts., Tenninkyo hot spring, 22 July 1999, leg. Jaschhof, 2 males, no. A0569-A0570; Sr, Ashibetsu City, Yubari Highlands, 5 July 1999, leg. Jaschhof, 1 male, no. A0568; Ir, Chitose City, 5 km E Lake Shikotsuko, 24 July 1999, leg. Jaschhof, 1 male, no. A0571; same data, but 26 July 1999, 1 male, no. A0572; Sapporo City, Toyohira, 29 June-26 July 1999, leg. Fukuyama & Jaschhof, 4 males, no. A1308-A1311; same locality, but 26 July-16 Aug. 1999, 2 males, no. A1312-A1313; Iu, Tomakomai City, Hokkaido University Experimental Forest, 30 June-26 July 1999, leg. Jaschhof, 7 males, no. A0573-A0579; Hn: Ao, Towadako Town, Tsuta hot spring, 28 July 1999, leg. Jaschhof, 4 males, no. A0581-A0584; same locality, but 25 June-28 July 1999, 13 males, no. A1314-A1326; Iw, Tamayama Village, Koma, 26 May-15 June 1999, leg. Gotoh, 1 male, no. A1328; same locality, but 15 June-4 July 1999, 2 males, no. A1329-A1330; Ib, Kitaibaraki City, Sadanami, Ogawa Forest, 9-25

July 1996, leg. Maeto, 11 males, no. A0109-A0114, A0120-A0124; same data, but 6-20 Aug. 1996, 6 males, no. A0554-A0559; Nn, Azumi Village, Norikurakogen, 14 July 2000, leg. Jaschhof, 2 males, no. A1409-A1410; Yn, Oyama Town, Mt. Fuji, 17 Aug.-6 Sept. 1999, leg. Jaschhof, 1 male, no. A1331; Ky, Kyoto City, Kuta Research Forest, 22 Sept.-24 Oct. 1999, leg. Jaschhof, 1 male, no. A1332; Na, Nara City, Mt. Kasuga, 9 June 1968, leg. Yukawa, 1 male; Sh: Ko, Yusuhara Town, Takatoriya Forest Reserve, 1-16 June 2000, leg. Maeto, 1 male, no. A1488; Ku: Ns, Sotome Town, 11 Oct. 1999, leg. Jaschhof, 1 male, no. A1347; Mz, Aya Town, Aya Research Forest, 5-20 Oct. 1999, leg. Jaschhof, 8 males, no. A1333-A1342; same locality, but 7 Oct. 1999, 2 males, no. A1340-A1341; Takachiho Town, 15 Oct. 1999, leg. Jaschhof, 3 males, no. A1343-A1345; Morotsuka Village, 16 Oct. 1999, leg. Jaschhof, 1 male, no. A1346; Ry: Ow, Iriomote Island, Funaura, 5-10 March 1999, leg. Jaschhof, 1 male, no. A0563; Okinawa, Yambaru Peninsula, Benoki Dam, 6-18 May 2000, leg. Jaschhof, 3 males, no. A1348-A1350; Okinawa, Mt. Nishimidake, 12-13 May 2000, leg. Jaschhof, 2 males, no. A1351-A1352; Bo-Tk: Hahajima, Mt. Kuwanoki, 16-19 Oct. 1998, leg. Jaschhof, 3 males, no. A0115-A0117; Hahajima, Koumoridani, 4-10 Oct. 1999, leg. Kitajima & Gotoh, 1 male, no. A1353; Hahajima, Minamizaki, 5-10 Oct. 1999, leg. Kitajima & Gotoh, 3 males, no. A1354-A1356; Chichijima, Mt. Kohi, 22 Oct.-17 Nov. 1998, leg. Ohbayashi & Jaschhof, 2 males, no. A0118-A0119; same data, but 17 Nov.-1 Dec. 1998, 2 males, no. A0560-A0561.

Remark. The original description of this species was published in Misc. ent., 3(6): 62 (not Misc. ent., 3(7): 75, as stated by Jaschhof (1998: 476)).

Peromyia photophila (Felt, 1907)

Supplement to description. Male.

Abdomen/pattern of tergal plaques: 0 / 2 / 2 / 2 / 1 / 1 / 0 / 0.

Discussion. *Peromyia photophila* is characterized by its male genitalia having the gonostyli strongly tapered to tip and the ventral plate of tegmen narrower and shorter than the tegmen itself and in proximal half clearly narrower than in distal half. By these characters *photophila* is usually readily distinguished from similar species (cf. *revelata* and *truncata*, see below). Some specimens however cause difficulties in identification in that their gonostyli are not so strongly tapered and their ventral plate is wider than described above. There are several specimens that I leave unidentified and those specimens may indicate that the morphological limits between *photophila* on the one hand and *revelata* and *truncata* on the other hand are not as sharp as one could conclude from the descriptions and figures previously published. Additionally, gonostyli in *photophila* have their outer margins typically evenly curved, but sometimes the outer margin appears to be clearly angled in basal half.

Distribution and biology. Hk (So, Kk, Ir, Hd, Iu), Hn (Ao, Ak, Iw, Ib, Nn, Sz, Ky, Os, Hy, Hi), Sh (Ko), Ku (Fu, Kt, Km, Mz), Ry-Km, Ry-Ow, Bo-Tk.

Corresponding to the wide distribution within Japan, *photophila* was found to inhabit all main types of natural forest, from lowland up to 2100 m a. s. l. Further, it was rarely found in plantations of sugi (*Cryptomeria japonica*). Flight period: Hk: VII-VIII; Hn: V-XI; Sh: XI; Ku: IV-VI, IX-X; Ry: III-V, X; Bo: I, X.

Material studied (118 males). Hk: So, Rishiri Island, Rishiri Town, 13 July 1999, leg. Jaschhof, 3 males, no. A0683-A0685; Hd, Hidaka Town, Hidaka Mts., 3 July 1999, leg. Jaschhof, 1 male, no. A0686; Kk, Higashikawa Town, Ishikari Mts., Tenninkyo hot spring, 22 July 1999, leg. Jaschhof, 1 male, no. A0687; Furano City, Rokugo Village, Tokyo University Experimental Forest, 5-23 July 1999, leg. Jaschhof, 1 male, no. A1224; Ir, Chitose City, 5 km E Lake Shikotsuko, 24 and 26 July 1999, leg. Jaschhof, 4 males, no. A0688-A0691; Sapporo City, Toyohira, 26 July-16 Aug. 1999, leg.

Fukuyama & Jaschhof, 2 males, no. A1225-A1226; Iu, Tomakomai City, Hokkaido University Experimental Forest, 30 June-26 July 1999, leg. Jaschhof, 4 males, no. A0695, A0697-A0699; Hn: Ao, Shichinohe Town, 28 July 1999, leg. Jaschhof, 6 males, no. A0659-A0664; Towadako Town, Tsuta hot spring, 25 June 1999, leg. Jaschhof, 2 males, no. A0665-A0666; same data, but 28 July 1999, 4 males, no. A0667-A0670; same data, but 25 June-28 July 1999, 4 males, no. A0671-A0672, A1237-A1238; Ak, Minehama Village, Shirakami Mts., Mizusawa River Valley, 22 and 23 June 1999, leg. Jaschhof, 10 males, no. A0673-A0682; Iw, Ashiro Town, Appi Highlands, Mt. Appidake, 19 June-29 July 1999, leg. Jaschhof, 6 males, no. A1239-A1242, A1357-1358; Morioka City, Kuriya River, 26 May 1968, leg. Yukawa, 1 male; Ib, Kitaibaraki City, Sadanami, Ogawa Forest, 9-25 July 1996, leg. Maeto, 3 males, no. A0056, A0062, A0638; same data, but 14-27 May 1996, 1 male, no. A0639; same data, but 6-20 Aug. 1996, 2 males, no. A0640-A0641; same data, but Ogawa Research Forest, 3 May 1999, leg. Jaschhof, 1 male, no. A0642; same data, but 11 May-1 June 1999, 6 males, no. A1475-A1480; Nanakai Village, Oami, 8-22 Oct. 1999, leg. Makino, 1 male, no. A1359; Nn, Mitake Village, Mt. Ontake, 16 Aug.-7 Sept. 1999, leg. Jaschhof, 4 males, no. A1227-A1230; Kiso Village, Mizukisawa Forest, 16 Aug.-6 Sept. 1999, leg. Jaschhof, 5 males, no. A1231-A1235; Sz, Fujinomiya City, Mt. Fuji, 6 June 1999, leg. Jaschhof, 1 male, no. A0653; Ky, Kyoto City, Kuta Research Forest, 22 Sept.-24 Oct. 1999, leg. Jaschhof, 1 male, no. A1236; Kyoto City, Fushimi, Momoyama, mid-Oct.-mid. Nov. 1999, leg. Fujita, 3 males, no. A1243-A1244; Os, Mino, 29 Sept. 1995, leg. Jaschhof, 1 male, no. A0050; Hy, Mt. Hyonosen, 28 Sept. 1995, leg. Jaschhof & Yagi, 1 male, no. A0049; Sh: Ko, Kochi City, Asakura, 4 Nov. 1998, leg. Jaschhof, 2 males, no. A0654-A0655, Yusuhara City, Takatoriyama Forest Reserve, 5 Nov. 1998, leg. Jaschhof, 2 males, no. A0656-A0657; same data, but 5-19 Nov. 1998, leg. Maeto & Jaschhof, 1 male, no. A0658; Ku: Km, Kagoshima City, Ono Town, 3 May 1978, leg. Yukawa, 1 male; Hiyoshi Town, Kamino River, 5 April 1968, leg. Yukawa, 1 male; Kt, Kumamoto City, Tatsudayama Experimental Forest, 17 Sept.-17 Oct. 1999, leg. Ito, 1 male, no. A1256; Mz, Aya Town, Aya Research Forest, 5-20 Oct. 1999, leg. Jaschhof, 3 males, no. A1246-A1248; same locality, but 6 Oct. 1999, 3 males, no. A1249-A1251; Lake Miike, 21 May 2000, leg. Jaschhof, 4 males, no. A1252-A1255; Ry: Km, Amami Oshima, Kawauchi Village, Kamiya Forest, 26 March 1999, leg. Jaschhof, 2 males, no. A0644-A0645; same data, but 30 March 1999, 1 male, no. A0646; Ow, Iriomote Island, Ohara, 4 Oct. 1995, leg. Jaschhof, 3 males, no. A0051-A0053; Iriomote, Funaura, 5-6 Oct. 1995, leg. Jaschhof, 1 male, no. A0054; same data, but 8 March 1999, 1 male, no. A0650, Iriomote, Urauchigawa River Valley, 7 March 1999, leg. Jaschhof, 1 male, no. A0649; Iriomote, Komi, Maera River Valley, 14 March 1999, leg. Jaschhof, 2 males, no. A0651-A0652; Okinawa, Yambaru Peninsula, Yona Village, 18-22 March 1999, leg. Jaschhof, 1 male, no. A0647, same data, but 18 March 1999, 1 male, no. A0648; Benoki Dam, 6-18 May 2000, leg. Jaschhof, 2 males, no. A1258-A1259; Bo-Tk: Chichijima, Nagatani, 23 Oct. 1998, leg. Jaschhof, 6 males, no. A0055, A0057-A0061; Chichijima, Mt. Kofi, 12 Jan.-1 Febr. 1999, leg. Ohbayashi & Jaschhof, 1 male, no. A0643.

***Peromyia revelata* Mamaev et Berest, 1990**

(Figs. 49A-D)

Discussion. Among the material studied, there are numerous specimens that do not fit either *P. photophila* or *truncata* but largely correspond with the original description given for *P. revelata*, particularly the illustration of its male genitalia (cf. Mamaev & Berest 1990: 22, Fig. 2.5). Even when I have not been able yet to study the types of *revelata*, I adopt this name for specimens with the following characters: gonostyli (Figs. 49A-C) are as wide distally as proximally or even wider (and thus almost identical with those in *truncata*), the ventral plate of tegmen (Fig. 49D) is narrower and shorter than the tegmen

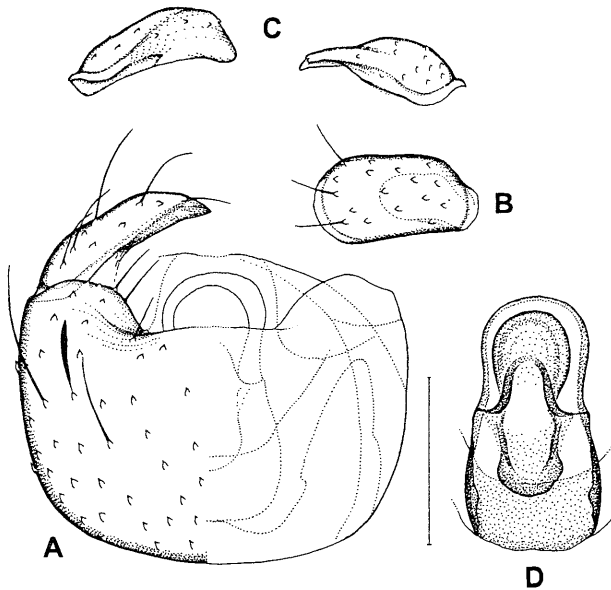
itself and has an almost U-shaped, sclerotized sculpture at midlength (the sculpture may be faint sometimes, but in this case the ventral plate looks "stretched" at midlength), gonocoxites are thick, i. e. much extended in its third dimension. The latter character is most striking in undissected specimens in lateral view. All other features correspond completely with those in *photophila* and *truncata*. In several slide-mounts of *revelata* genitalia, gonostyli appear to be clearly tapered to tip when looked at from laterally (thus resembling the gonostyli in *photophila*), but actually they do not taper as it becomes obvious when such gonostyli are looked at from above (cf. Fig. 49C).

Distribution and biology. New record for Japan. Hk (Kk, Ir, Iu), Hn (Iw, Ky), Ku (Fu, Kt, Oi, Mz).

Specimens of *revelata* were captured in various forest types, such as northern subalpine, mixed deciduous, and evergreen broad-leaved, in elevations up to 700 m a. s. l. Flight period: Hk: VII; Hn: VI, IX-X; Ku: V-VI.

Material studied (37 males). Hk: Kk, Furano City, Rokugo Village, Tokyo University Experimental Forest, 5-23 July 1999, leg. Jaschhof, 3 males, no. A1275-A1277; Ir, Sapporo City, Toyohira, 29 June-26 July 1999, leg. Fukuyama & Jaschhof, 3 males, no. A1272-A1274; Iu, Tomakomai City, Hokkaido University Experimental Forest, 30 June-26 July 1999, leg. Jaschhof, 21 males, no. A0692-A0694, A0696, A0700-A0709, A0784-A0790; Hn: Iw, Tamayama Village, Koma, 26 May-15 June 1999, leg. Gotoh, 2 males, no. A1278-A1279; same locality, but 15 June-4 July 1999, 3 males, no. A1280-A1282; Ky, Kyoto City, Kuta Research Forest, 22 Sept.-24 Oct. 1999, leg. Jaschhof, 1 male, no. 1283; Ku: Mz, Lake Miike, 21 May 2000, leg. Jaschhof, 4 males, no. 1284-A1287.

The following specimens in the Yukawa collection, previously identified as belonging to *photophila*, are also referred to here: no. 13701, 63908, 63910-11, and 69417.



Figs. 49A-D: *Peromyia revelata* Mamaev et Berest, 1990, male; A: genitalia, ventral view; B: gonostylus, seen from above; C: gonostyli of the same specimen, seen from different angles of view; D: tegmen, ventral view. A-D: specimens from Tomakomai City. (Length of scale bar: 0.05 mm.)

Peromyia truncata Yukawa, 1967*Supplement to description. Male.*

Abdomen/pattern of tergal plaques: 0 / 2 / 2 / 2 / 1 / 1 / 0 / 0.

Discussion. Problems of artefacts and variability in the male genitalic structures in *P. truncata* have been discussed earlier (cf. Jaschhof 1996a). Even on the basis of the many more specimens studied here I could not find indisputable evidence for that there is more than one species, *truncata*. On the other hand, I must leave several specimens unidentified to species that are morphologically in between *truncata* and *photophila*, or *truncata* and *revelata*. In *truncata*, ventral plate of tegmen is usually as wide or wider than the tegmen itself, but in some specimens of questionable identity it appears to be narrower.

Distribution and biology. Hk (Kk, Ir), Hn (Ao, Ib, Yn, Na, Os), Sh (Ko), Ku (Fu, Ns, Mz), Ry-Km, Ry-Ow.

Corresponding to the wide distribution within Japan, *truncata* was found to inhabit all main types of natural forest from lowland up to 2000 m a. s. l. Flight period: Hk: VII; Hn: V-IX; Sh: VI; Ku: V-VI, X; Ry: III, V, X.

Material studied (100 males). Hk: Ir, Chitose City, 5 km E Lake Shikotsuko, 24 and 26 July 1999, leg. Jaschhof, 2 males, no. A0721-A0722; Kk, Furano City, Rokugo Village, Tokyo University Experimental Forest, 5-23 July 1999, leg. Jaschhof, 1 male, no. A1288; Hn: Ao, Towadako Town, Tsuta hot spring, 25 June-28 July 1999, leg. Jaschhof, 5 males, no. A0716-A0717, A1289-A1291; Ib, Kitaibaraki City, Sadanami, Ogawa Forest, 9-25 July 1996, leg. Maeto, 6 males, no. A0068-A0071, A0710-A0711; same data, but 6-20 Aug. 1996, 2 males, no. A0712-A0713; same data, but Ogawa Research Forest, 3 May 1999, leg. Jaschhof, 2 males, no. A0714-A0715; Mt. Tsukuba, 12-31 May 1999, leg. Jaschhof, 4 males, no. A1374-A1377; Yn, Oyama Town, Mt. Fuji, 17 Aug.-6 Sept. 1999, leg. Jaschhof, 1 male, no. A1292; Na, Nara City, Mt. Kasuga, 9 June 1968, leg. Yukawa, 5 males; Os, Mino, 29 Sept. 1995, leg. Jaschhof, 2 males, no. A0064-A0065; Sh: Ko, Yusuhara Town, Takatoriama Forest Reserve, 1-16 June 2000, leg. Maeto, 1 male, no. A1489; Ku: Fu, Mt. Tachibana, 25 May 2000, leg. Jaschhof, 1 male, no. 1293; Ns, Sotome Town, 11 Oct. 1999, leg. Jaschhof, 2 males, no. 1294-1295; Mz, Aya Town, Aya Research Forest, 7 Oct. 1999, leg. Jaschhof, 1 male, no. A1296; same locality, but 5-20 Oct. 1999, 3 males, no. A1297-A1299; Ry: Km, Amami Oshima, Kawauchi Village, Kamiya Forest, 26 March 1999, leg. Jaschhof, 33 males, no. A0729-A0762; Amami Oshima, Uken Village, 27 March 1999, leg. Jaschhof, 1 male, no. A0728; Yaku Island, Yaku Town, Mugio, 29 March 1968, leg. Yukawa, 3 males; Ow, Iriomote Island, Ohara, 4 Oct. 1995, leg. Jaschhof, 1 male, no. A0066; same data, but 8 March 1999, 4 males, no. A0768-A0771; Iriomote, Funaura, 5-6 Oct. 1995, leg. Jaschhof, 1 male, no. A0067; same data, but 6 March 1999, 2 males, no. A0764-A0765; Iriomote, Urauchigawa River Valley, 7 March 1999, leg. Jaschhof, 2 males, no. A0766-A0767; Iriomote, Komi, Maera River Valley, 9 March 1999, leg. Jaschhof, 3 males, no. A0772-A0774; same data, but 14 March 1999, 9 males, no. A0775-A0783; Tokashiki Island, 2 March 1999, leg. Jaschhof, 1 male, no. A0763; Okinawa, Yambaru Peninsula, Mt. Nishimedake, 12 May 2000, leg. Jaschhof, 1 male, no. A1300.

Peromyia perpusilla-group

In species of the *perpusilla*-group, male genitalia are characterized by long, curved gonostyli and gonocoxites that are covered with comparatively strong setae ventrally. With respect to the former character, *perpusilla*- and *modesta*-group overlap because some of the species that are better referred to the *modesta*-group have their gonostyli of the *perpusilla*-type.

Both the species previously forming the *perpusilla*-group occur in Japan, another species is here described as new to science.

***Peromyia fujiensis* sp. n.**
(Figs. 50A-C)

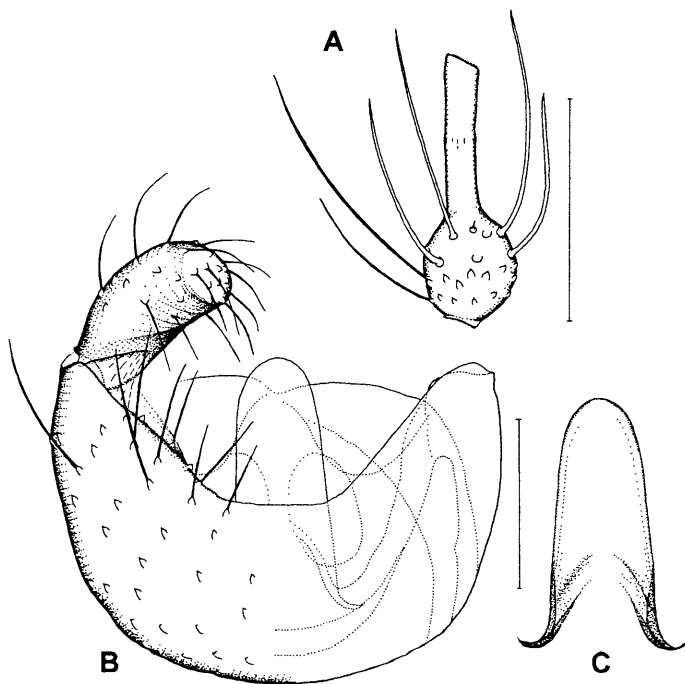
Male. Body size: 0.9-1.0 mm.

Head: Postfrons non-setose. Eye bridge 1-2 facets long laterally and 2-3 facets at vertex. With 1 row of postocular bristles. Antennae with 12 flagellomeres; terminal flagellomere constricted and with small additional node. Flagellomere 4 (Fig. 50A) with neck much longer than node; node with single to double whorl of comparatively long setae basally, next to it with double to triple whorl of long setae, medially, just beyond setae, with sparse and irregular whorl of sensory hairs, distally with sparse and irregular whorl of long sensory hairs, additionally with a few sensory spines. Palpi 3 to 4-segmented, when 3-segmented terminal segment longest, all segments except terminal one with sensory hairs.

Thorax: Scutum with sparse lateral and dorsocentral rows of setae. Empodia as long as claws. Claws of midlegs with very fine teeth. Wings long and rather slender, $R1 = 4\text{ rs}$, strong anterior portion of C extending point of intersection with R5 for 2-3 times the vein width of R5, fork of CuA very acute.

Abdomen: Pattern of tergal plaques uncertain.

Genitalia: Gonocoxites (Fig. 50B) covered with comparatively strong setae ventrally except its small membranous central portion, its distal margin with wide emargination



Figs. 50A-C: *Peromyia fujiensis* sp. n., male; A: flagellomere 4, lateral view (0.01 mm); B: genitalia, ventral view (0.05 mm); C: tegmen, ventral view (0.05 mm). A-C: holotype. (In parentheses: length of scale bar.)

extending to less than midlength of gonocoxites. Gonostyli (Fig. 50B) elongate, curved, with its tips directed ventrad and thus appearing shorter, tapering to tip, with long setation elsewhere but most densely at apex. Tegmen (Fig. 50C) almost parallel-sided, with broadly rounded distal margin, without any modifications. Tergite 9 rather long, forming a sclerotized semicircle with medial interruption of sclerotization, with interrupted row of setae along distal margin. Tergite 10 and sternite 10 bilobed, large, densely pubescent, tergite 10 additionally with a very few short setae.

Female. Unknown.

Types. Holotype: male, no. A0898, Japan, Honshu, Yamanashi Pref., Oyama Town, Mt. Fuji, east slope, in subalpine forest of fir (*Abies veitchii*) and larch (*Larix kaempferi*), 1900 m, 4-13 June 1999, by Malaise trap, leg. Jaschhof [in KUEC]. Paratypes: 2 males, no. A0899-A0900, same data as holotype [in ZIMG].

Discussion. *Peromyia fujiensis* can be readily distinguished from other group members by its very simple tegmen lacking any conspicuous structures. Further, its antennal flagellomeres have much longer necks and the vestiture of node is much sparser compared with other species.

Distribution and biology. Hn (Yn).

The type series is all that is so far known of *fujiensis*. For details of habitat and flight period, see under types.

Etymology. The name is derived from the type-locality, Mt. Fuji.

***Peromyia perpusilla* (Winnertz, 1870)**

Supplement to description. **Male.**

Head: Postfrons non-setose.

Abdomen/pattern of tergal plaques: 0 / 2 / 2 / 2 / 1 / 0-1 / 0 / 0.

Distribution and biology. New record for Japan. Hn (Ao, Ak).

Japanese specimens of *perpusilla* were collected in mature deciduous forests dominated by beech (*Fagus crenata*) between 500-1000 m a. s. l. in summer.

Material studied (2 males). Hn: Ao, Towadako Town, Tsuta hot spring, 25 June-28 July 1999, leg. Jaschhof, 1 male, no. A0897; Ak, Fujisato Town, Shirakami Mts., Mt. Futatsumori, 23 June 1999, leg. Jaschhof, 1 male, no. A0437.

***Peromyia tundrae* Jaschhof, 1996**

Supplement to description. **Male.**

Head: Postfrons non-setose. Palpi sometimes 4-segmented.

Thorax/wings: Strong anterior portion of C extending point of intersection with R5 for up to once the vein width of R5.

Abdomen/pattern of tergal plaques: 0 / 2 / 2 / 2 / 1 / 1 / 0 / 0.

Discussion. *Peromyia tundrae* was described to have the gonostyli with a particularly dense group of setae inside subbasally (cf. Jaschhof 1996b: 353). In most of the Japanese specimens, this group of setae appears to cover a slight swelling. Additionally, in some specimens tegmen is a little wider below than beyond ventral plate.

Distribution and biology. New record for Japan. Hk (So), Hn (Ib).

Peromyia tundrae was captured twice in Japan: in a subalpine forest dominated by fir (*Abies sachalinensis*) at 200-300 m a. s. l. and in a plantation of sugi (*Cryptomeria japonica*) mixed with deciduous trees at 600 m a. s. l. Flight period: Hk: VII; Hn: V-VI.

Material studied (14 males). Hk: So, Rishiri Island, Rishiri Town, 13 July 1999, leg. Jaschhof, 9 males, no. A0438-A0446; Hn: Ib, Kitaibaraki City, Sadanami, Ogawa Forest, 27 May-11 June 1996, leg. Maeto, 5 males, no. A1491-A1495.

Peromyia sanguinea-group

The *sanguinea*-group, as defined earlier (cf. Jaschhof 1998), comprises species that have their male genitalia with slender, widely unmodified gonostyli and the tegmen elongate and having its ventral plate inconspicuous or absent. These characters cannot conclusively justify the monophyly of the *sanguinea*-group, but with certainty some of the included species are more closely related among themselves than to *Peromyia* outside this group. Unlike the group composition proposed in Jaschhof (l. c.), the following species are excluded here: *P. cornuta* (Edw.) (transferred into the *cornuta*-group), and *P. curta* Jasch. (transferred into the *curta*-group).

Six of 11 Holarctic species certainly belonging to this group were found to occur within Japan. Four of them are here described as new to science.

Peromyia apposita Jaschhof, 1997

Supplement to description. Male.

Head: Postfrons non-setose. Posterior row of postocular bristles sometimes complete.

Thorax/wings: Strong anterior portion of C extending point of intersection with R5 for 0.2 times the vein width of R5, R1 = 2.5-3.5 rs.

Abdomen/pattern of tergal plaques: 0 / 2 / 2 / 2 / 1 / 1 / 0 / 0.

Genitalia: Gonostyli slender if seen from ventrally (as described in Jaschhof 1997) but broader if seen from above. Tegmen often somewhat constricted subterminally resulting in a rounded terminal "head".

Discussion. Japanese specimens of *apposita* are more variable compared with those previously described from Germany. This applies, for example, to the length of the posterior row of postocular bristles and costa, or the shape of gonostyli. One of the specimens studied (no. A1378), mounted in such a way that its gonostyli may be looked at from inside, have three to four weak spines at midlength of gonostyli. Two specimens in my collection (no. A0975 from Amami Oshima, Kagoshima Pref., and no. A0976 from northern Honshu, Akita Pref.) correspond with *apposita* except that their flagellomeres have only one irregular whorl of sensory hairs medially. For the time being, I leave these latter specimens unidentified.

Distribution and biology. New record for Japan. Hk (Ir), Hn (Ao, Iw, Fs, Ib, Nn, Ky), Ku (Ns, Mz), Ry-Ow.

Specimens of *apposita* were collected in various forest types between 300 and 2000 m a. s. l.: subalpine, deciduous (with and without beech), evergreen broad-leaved, and mixed deciduous / coniferous. Two specimens originate from a plantation of sugi (*Cryptomeria japonica*) mixed with deciduous trees. Flight period: Hk: VII; Hn: V-X; Ku: X; Ry: V.

Material studied (21 males). Hk: Ir, Chitose City, 5 km E Lake Shikotsuko, 26 July 1999, leg. Jaschhof, 1 male, no. A0509; Hn: Ao, Towadako Town, Tsuta hot spring, 25 June 1999, leg. Jaschhof, 1 male, no. A0937; same locality, but 25 June-28 July 1999, 3 males, no. A0938-A0940; Iw, Tamayama Village, Koma, 15 June-4 July 1999, leg. Gotoh, 1 male, no. A1089; Ashiro Town, Appi Highland, Mt. Appidake, 19 June-29 July 1999, leg. Jaschhof, 1 male, no. A1113; Fs, Iwaki City, Tabito, 7 Oct. 1998, leg. Jaschhof, 1 male, no. A1126; Ib, Kitaibaraki City, Sadanami, Ogawa Forest, 6-20 Aug. 1996, leg. Maeto, 1 male, no. A0510; same locality but, 27 May-11 June 1996, 2 males, no. A1497-A1498; same data, but Ogawa Research Forest, 11 May-1 June 1999, leg.

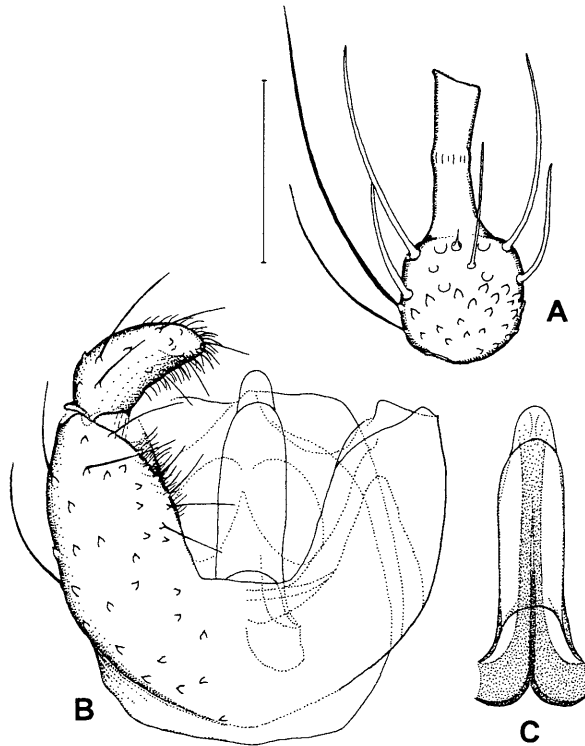
Jaschhof, 1 male, no. A1425; Mt. Tsukuba, 12 May 1999, leg. Jaschhof, 1 male, no. A1125; same data, but 12-31 May 1999, 1 male, no. A1378; Nn, Mitake Village, Mt. Ontake, 16 Aug.-7 Sept. 1999, leg. Jaschhof, 1 male, no. A0941; Ky, Kyoto City, Kuta Research Forest, 22 Sept.-24 Oct. 1999, leg. Jaschhof, 1 male, no. A0942; Ku: Ns, Sotome Town, 11 Oct. 1999, leg. Jaschhof, 1 male, no. A0943; Mz, Aya Town, Aya Research Forest, 5-20 Oct. 1999, leg. Jaschhof, 1 male, no. A0944; same locality, but 6 Oct. 1999, 1 male, no. A0945; Ry: Ow, Okinawa, Yambaru Peninsula, Benoki Dam, 13 May 2000, leg. Jaschhof, 2 males, no. A1036-A1037..

***Peromyia avia* sp. n.**

(Figs. 51A-C)

Male. Body size: 1.0 mm.

Head: Postfrons non-setose. Eye bridge 1-2 facets long laterally and 2-3 facets at vertex. With 1 row of postocular bristles. Antennal flagellum broken in specimens available with maximally 8 flagellomeres remaining. Flagellomere 4 (Fig. 51A) with neck little longer than node; node with single to double whorl of setae basally, next to it with single to triple whorl of long setae, medially with whorl of short sensory hairs, distally with whorl of long sensory hairs, in between these whorls with single short, fine sensory hairs, distally with a few sensory spines. Palpi 4-segmented, also second and third segments with sensory hairs.



Figs. 51A-C: *Peromyia avia* sp. n., male; A: flagellomere 4, lateral view; B: genitalia, ventral view; C: tegmen, ventral view. A-C: holotype (Length of scale bar: 0.05 mm.)

Thorax: Scutum with lateral and dorsocentral rows of setae. In holotype, with 1 small, membranous dot posterior of the lateral setose portion (absent in paratypes). Empodia as long as claws. Claws of midlegs with 2-3 fine teeth. Wings: R1 = 3.5 rs, strong anterior portion of C extending point of intersection with R5 for once the vein width of R5.

Abdomen/pattern of tergal plaques: 0 / 2 / 2 / 2 / 1 / 0-1 / 0 / 0.

Genitalia: Gonocoxites (Fig. 51B) covered with setae ventrally except their large membranous central and most proximal portions, inner gonocoxal bridge with dense cover of hairs, distal margin with deep emargination extending beyond midlength of gonocoxites. Gonostyli (Fig. 51B) elongate, curved, tapering to tip, sparsely covered with setae, with long hairs apically and inside. Tegmen (Fig. 51C) elongate, slender, parallel-sided, with striking dark, longitudinal bar, its ventral plate long and distinct, with horseshoe-shaped, weakly sclerotized proximal margin and distal margin extending to 4/5 of tegmen length. Tergite 9 rather long, with medial interruption of sclerotization, with interrupted row of setae along distal margin, distal margin almost straight. Tergite 10 bilobed, densely pubescent and with a few short setae. Sternite 10 bilobed, densely pubescent.

Female. Unknown.

Types. Holotype: male, no. A0974, Japan, Honshu, Tokyo City, Imperial Palace Gardens, in mixed deciduous / evergreen broad-leaved forest with conifers, 16 Nov. 1998, by sweepnet, leg. Jaschhof [in KUEC]; Paratypes: 1 male, no. A1082, Kyushu, Kumamoto Pref., Kumamoto City, Tatsudayama Experimental Forest, at edge of mixed forest of evergreen oak (*Quercus* sp.) and hinoki (*Chamaecyparis obtusa*), 17 Sept.-17 Oct. 1999, by Malaise trap, leg. Ito; 1 male, no. A1118, same locality, but 21 April-31 May 1999 [all in ZIMG].

Discussion. The systematic position of *P. avia* is somewhat uncertain. For the time being, this species is tentatively classified into the *sanguinea*-group because its male genitalia have a long, slender tegmen and small, tapered gonostyli. Among species of the *sanguinea*-group, *avia* is readily identified by its tegmen with long, distinct ventral plate and striking dark longitudinal bar.

Distribution and biology. Hn (Iw, To), Ku (Kt).

The few specimens known were collected in various forests, both mixed deciduous and mixed broad-leaved / coniferous. Flight period: Hn: VI, XI; Ku: IV-V, IX-X.

Etymology. The name is Latin meaning "solitary".

Other material studied (1 male). Hn: Iw, Tamayama Village, Koma, 15 June-4 July 1999, leg. Gotoh, 1 male, no. A1091.

Peromyia capitata sp. n.

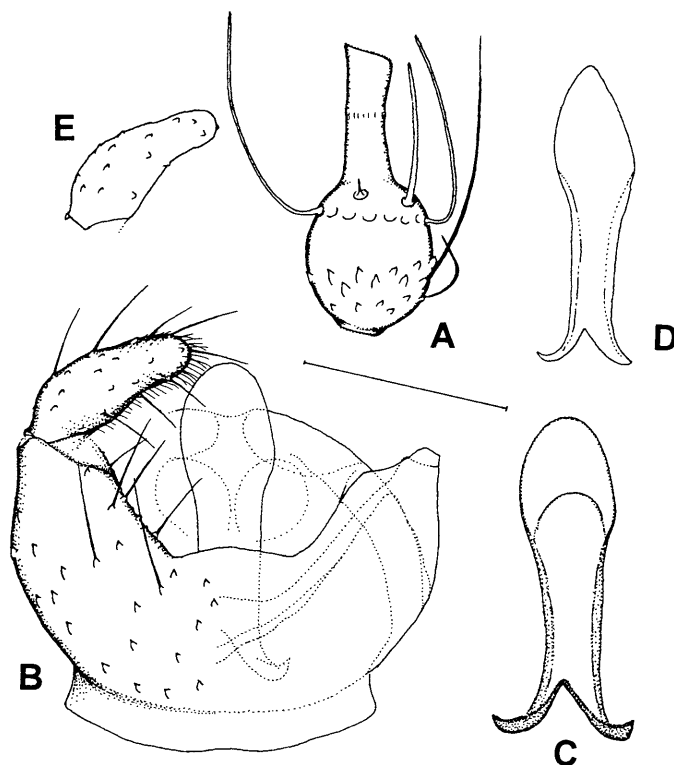
(Figs. 52A-E)

Male. Body size: 0.7-0.8 mm.

Head: Postfrons non-setose. Eye bridge 2-3 facets long laterally and 3 facets at vertex. With 1 row of postocular bristles. Antennae with 12 flagellomeres; terminal flagellomere constricted and with small additional node. Flagellomere 4 (Fig. 52A) with neck approximately as long as node; node with dorsally incomplete whorl of short scales basally, next to it with single to triple whorl of long setae, distally with whorl of fine, long sensory hairs that easily break, additionally with a few stronger sensory hairs and sensory spines. Palpi 4-segmented (exceptionally 3-segmented with the 2 distal segments clearly fused), also second segment with a few sensory hairs.

Thorax: Scutum with lateral and dorsocentral rows of setae. Empodia as long as claws. Claws without teeth. Wings: R1 = 2.5-3 rs, strong anterior portion of C extending point of intersection with R5 for 1-2 times the vein width of R5.

Abdomen/pattern of tergal plaques: 0 / 2 / 2 / 2 / 1 / 0-1 / 0 / 0.



Figs. 52A-E: *Peromyia capitata* sp. n., male; A: flagellomere 4, lateral view; B: genitalia, ventral view; C, D: tegmen, ventral view; E: gonostylus, ventral view. A-C: holotype, D, E: paratypes. (Length of scale bar: 0.05 mm.)

Genitalia: Gonocoxites (Fig. 52B) covered with long setae ventrally except its most proximal portion, its distal margin with emargination extending to less than midlength of gonocoxites. Gonostyli (Figs. 52B, E) elongate, slenderer in distal half, covered with long setae, with brush of long hairs in distal third. Tegmen (Figs. 52C, D) long, slender, spoon-like widened in distal half, rounded to almost pointed apically, with weak ventral plate clearly shorter than tegmen itself and visible only by its distal margin. Tergite 9 short, forming a sclerotized semicircle with medial interruption of sclerotization, with interrupted row of setae along distal margin. Tergite 10 bilobed, densely pubescent and with a few long setae. Sternite 10 bilobed, densely pubescent.

Female. Unknown.

Types. Holotype: male, no. A1420, Japan, Honshu, Nagano Pref., Azumi Village, Norikurakogen, in secondary, mixed deciduous forest, 1550 m, 14 July 2000, by sweepnet, leg. Jaschhof [in KUEC]. Paratypes: 1 male, no. A1421, Honshu, Ibaraki Pref., Abukuma Highlands, Kitaibaraki City, Sadanami, Ogawa Forest, in secondary, mixed deciduous forest, 600 m, 9-25 July 1996, by Malaise trap, leg. Maeto; 3 males, no. A1422-A1424, same locality, but 6-20 Aug. 1996 [all in ZIMG].

Discussion. *Peromyia capitata* is best characterized by its male genitalia having the tegmen long and strikingly spoon-like widened in distal half. This character helps to separate readily *capitata* from *P. minutissima* Mam. and *P. sanguinea* Kieff., both sharing with *capitata* the same vestiture on antennal flagellomeres.

Distribution and biology. Hn (Ib, Nn).

For details of habitat, see under types. Flight period: Hn: VII-VIII.

Etymology. The name is Latin meaning "having a head" and refers to the tegmen which is head-like widened distally.

***Peromyia pilosa* sp. n.**

(Figs. 53A-C)

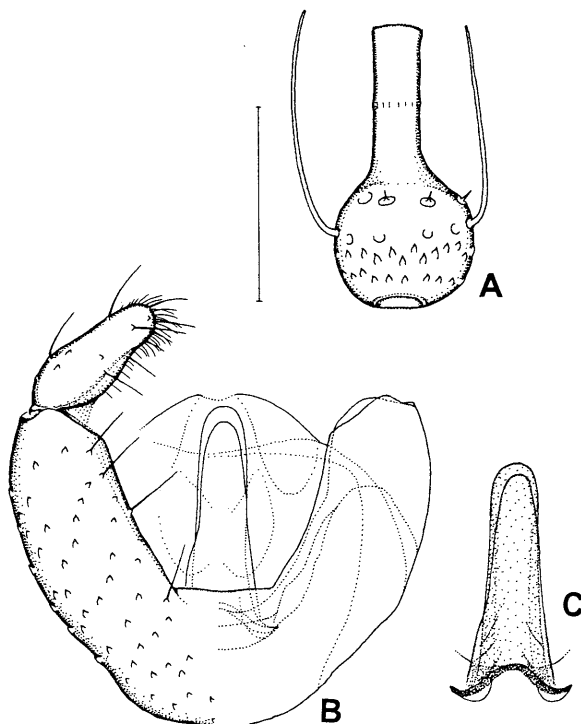
Male. Body size: 0.9-1.0 mm.

Head: Postfrons non-setose. Eye bridge 2-3 facets long laterally and 3 facets at vertex. With 2 rows of postocular bristles. Antennae with 12 flagellomeres; terminal flagellomere ovoid, with sharp constriction resulting in small additional node. Flagellomere 4 (Fig. 53A) with neck longer than node; node with single to triple whorl of short setae basally, next to it with double to triple whorl of long setae, medially, just beyond setae, with whorl of long sensory hairs, distally with a few sensory spines. Palpi 4-segmented, terminal segment little longer than third, also second segment with a few sensory hairs.

Thorax: Scutum with extensive lateral and dorsocentral rows of setae. Empodia as long as claws. Claws without teeth. Wings: R1 = 2-2.5 rs, strong anterior portion of C ending at point of intersection with R5 or going beyond for once the vein width of R5.

Abdomen/pattern of tergal plaques: 0 / 1 / 1 / 1 / 1 / 1 / 0 / 0.

Genitalia: Gonocoxites (Fig. 53B) slender, covered with setae and scales ventrally except its small membranous central portion, its distal margin with very deep



Figs. 53A-C: *Peromyia pilosa* sp. n., male; A: flagellomere 4, dorsal view; B: genitalia, ventral view; C: tegmen, ventral view. A-C: holotype. (Length of scale bar: 0.05 mm.)

emargination extending beyond midlength of gonocoxites. Gonostyli (Fig. 53B) elongate, evenly tapering to tip, sparsely covered with setae, with dense apical / subapical brush of long hairs. Tegmen (Fig. 53C) slender, slightly tapering to tip, completely membranous, with weak ventral plate a little shorter than tegmen itself. Tergite 9 short, forming a sclerotized semicircle with medial interruption of sclerotization, with interrupted row of setae along distal margin. Tergite 10 large, sometimes extending far beyond distal margin of tergite 9, densely pubescent and with a very few long setae. Sternite 10 bilobed, densely pubescent.

Female. Unknown.

Types. Holotype: male, no. A0249, Japan, Honshu, Ibaraki Pref., Abukuma Highlands, Kitaibaraki City, Sadanami, Ogawa Forest, in secondary deciduous forest, 600 m, 6-20 August 1996, by Malaise trap, leg. Maeto [in KUEC]. Paratypes: 5 males, no. A0250-A0254, same data as holotype [no. A0254 in KUEC, the others in ZIMG].

Discussion. This new species best fits the *sanguinea*-group by its slender gonostyli and tegmen. Among species of that group, *pilosa* is the only one having its flagellomeres with only one whorl of strong sensory hairs that is situated medially. Outside the *sanguinea*-group, male genitalia in *pilosa* are most similar to those in *P. gemella* (see *curta*-group), but antennal sensillae in the latter are appendiculate and tegmen structure is different.

Distribution and biology. Hn (Ib), Ku (Mz).

Specimens of *pilosa* were captured in deciduous and evergreen broad-leaved forests in 400-600 m a. s. l. Flight period: Hn: VIII; Ku: V, X.

Etymology. The name refers to the hairy gonostyli in this species (in Latin: *pilosa* = hairy).

Other material studied (6 males). Hn: Ib, Kitaibaraki City, Sadanami, Ogawa Forest, 6-20 August 1996, by Malaise trap, leg. Maeto, 3 males, no. A0342-A0344; Ku: Mz, Aya Town, Aya Research Forest, 7 Oct. 1999, leg. Jaschhof, 1 male, no. A0950; same locality, but 5-20 Oct. 1999, leg. Jaschhof, 1 male, no. A0951; Mz, Lake Miiike, 21 May 2000, leg. Jaschhof, 1 male, no. A0973.

Peromyia sanguinea (Kieffer, 1894)

Supplement to description. **Male.**

Head: Postfrons non-setose.

Abdomen/pattern of tergal plaques: 0 / 2 / 2 / 2 / 2 / 1 / 0 / 0.

Distribution and biology. New record for Japan. Hn (Ao, Ib), Ku (Mz).

The few Japanese specimens known were collected in deciduous (with beech) as well as in evergreen broad-leaved forests in 400-600 m a. s. l. Another specimen was captured over rotting oak logs for mushroom (shiitake) cultivation. Flight period: Hn: VII-VIII; Ku: X.

Material studied (4 males). Hn: Ao, Towadako Town, Tsuta hot spring, 25 June-28 July 1999, leg. Jaschhof, 1 male, no. A0946; Ib, Kitaibaraki City, Sadanami, Ogawa Forest, 6-20 Aug. 1996, leg. Maeto, 1 male, no. A0947; Ku: Mz, Aya Town, Aya Research Forest, 6 Oct. 1999, leg. Jaschhof, 1 male, no. A0948; Mz, Morotsuka Village, 16 Oct. 1999, leg. Jaschhof, no. A0949.

Peromyia yezoensis sp. n. (Figs. 54A-D)

Male. Body size: 0.9-1.0 mm.

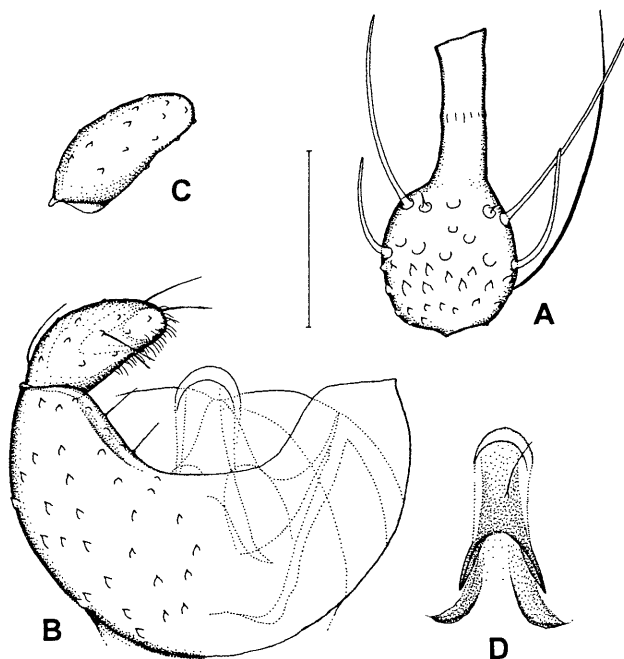
Head: Postfrons non-setose. Eye bridge 2-3 facets long laterally and 3 facets at vertex. With 1 row of postocular bristles. Antennae with 12 flagellomeres, terminal flagellomere constricted. Flagellomere 4 (Fig. 54A) with neck as long as node; node with single to double whorl of short setae basally, next to it with double to triple whorl of long setae, medially, just beyond setae, with irregular whorl of short sensory hairs, distally with irregular whorl of long sensory hairs, additionally with single fine sensory hairs and a few sensory spines. Palpi 3 to 4-segmented (even within an individual specimen with 3 and 4 segments), all segments (except terminal one if 4-segmented) with sensory hairs.

Thorax: Scutum with lateral and dorsocentral rows of setae. Empodia as long as claws. Claws without teeth. Wings: $R_1 = 2.5-3$ rs, strong anterior portion of C extending point of intersection with R_5 for 1(-2) times the vein width of R_5 .

Abdomen/pattern of tergal plaques: 0/2/2/2/2/1/0/0.

Genitalia: Gonocoxites (Fig. 54B) covered with setae ventrally except its small membranous central portion, its distal margin with emargination extending to less than midlength of gonocoxites, dorsal transverse bridge comparatively wide. Gonostyli (Figs. 54B, C) heavy, slightly and evenly tapering to tip, evenly covered with setae, with 1-3 weak, short spines dorsally, with fairly long hairs in distal third inside. Tegmen (Fig. 54D) elongate, almost parallel-sided, with rounded distal margin, with 1 or 2 fairly long setae in two of the specimens studied, ventral plate a little shorter than tegmen itself, with sclerotized, horseshoe-shaped proximal margin. Tergite 9 short, forming a sclerotized semicircle with medial interruption of sclerotization, with interrupted row of setae along distal margin. Tergite 10 bilobed, densely pubescent and with a few short setae. Sternite 10 bilobed, densely pubescent.

Female. Unknown.



Figs. 54A-D: *Peromyia yezoensis* sp. n., male; A: flagellomere 4, lateral view; B: genitalia, ventral view; C: gonostylus, ventral view; D: tegmen, ventral view. A, B: holotype, C, D: different paratypes. (Length of scale bar: 0.05 mm.)

Types. Holotype: male, no. A0597, Japan, Hokkaido, Kamikawa Sub-Pref., Higashikawa Town, Ishikari Mts., Tenninkyo hot spring, in subalpine forest dominated by fir (*Abies sachalinensis*), 800 m, 22 July 1999, by sweepnet, leg. Jaschhof [in KUEC]. Paratypes: 4 males, no. A0598-A0601, same data as holotype [all in ZIMG].

Discussion. Within the *sanguinea*-group, *yezoensis* resembles several other species by having the flagellomeres with two whorls of sensory hairs, a medial and distal each. Among those species, *yezoensis* is most similar to *P. apposita*. The differences are as follows (in parentheses: *apposita*): head with 1 row of postocular bristles (with 1.5 to 2 rows), gonostyli are heavy, in particular, in basal half and have up to three weak spines dorsally (gonostyli are slender and lack spines), tegmen has its ventral plate sclerotized, in particular its proximal margin (tegmen is completely membranous). Taken the unusual pattern of tergal plaques in *yezoensis* stable, the two species differ in that character too.

Distribution and biology. Hk (Kk), Hn (Iw).

Apart the type-series, only one additional specimen of *yezoensis* was captured in a deciduous forest dominated by beech (*Fagus crenata*) in 800 m a. s. l. Flight period: Hk: VII; Hn: VI-VII.

Etymology. The name is derived from Yezo, a historical name for Hokkaido.

Other material studied (1 male). Hn: Iw, Ashiro Town, 19 June-29 July 1999, leg. Jaschhof, 1 male, no. A1114.

Ungrouped species of *Peromyia*

These are species in which adult morphology does not provide indications for their closer relationship. *Peromyia albicornis* (Meig.), having been known from Japan by a single record (cf. Yukawa 1971: 29ff.), is also referred to here.

Peromyia angulata sp. n.

(Figs. 55A-C)

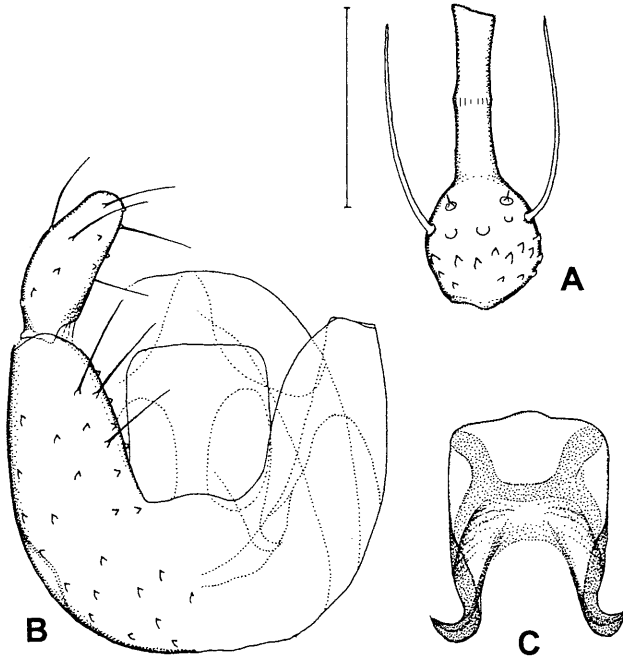
Male. Body size: 0.8 mm.

Head: Postfrons non-setose. Eye bridge 1-2 facets long laterally and 2-3 facets at vertex. With 1 row of postocular bristles. Antennae with 12 flagellomeres; terminal flagellomere constricted and with small additional node. Flagellomere 4 (Fig. 55A) with neck longer than node; node with sparse single to double whorl of short setae basally, next to it with single to triple whorl of long setae, distally with whorl of long sensory hairs, additionally with a few short, fine sensory hairs and sensory spines. Palpi 3 to 4-segmented (even in one and the same specimen).

Thorax: Scutum with sparse lateral and dorsocentral rows of setae. Empodia as long as claws. Claws at least of midlegs with 2-3 minute teeth. Wings: R1 = 3.5 rs, strong anterior portion of C extending point of intersection with R5 for once the vein width of R5.

Abdomen: Pattern of tergal plaques uncertain.

Genitalia: Gonocoxites (Fig. 55B) covered with long setae ventrally except its membranous central portion, its distal margin with U-shaped emargination extending to midlength of gonocoxites. Gonostyli (Fig. 55B) elongate, slightly tapering to tip, rounded apically, somewhat flattened when seen from above, sparsely and evenly covered with long setae. Tegmen (Fig. 55C) heavy, membranous except its parameral apodemes, almost rectangular distally, with bare lobe (?) ventroproximally and a central pigmented area with distolateral "horns". Tergite 9 rather long, forming a sclerotized semicircle with wide medial interruption of sclerotization, with interrupted row of short



Figs. 55A-C: *Peromyia angulata* sp. n., male; A: flagellomere 4, lateral view; B: genitalia, ventral view; C: tegmen, ventral view. A, B: holotype, C: paratype. (Length of scale bar: 0.05 mm.)

setae along distal margin. Tergite 10 bilobed, large, densely pubescent and with a few short setae. Sternite 10 bilobed, densely pubescent.

Female. Unknown.

Types. Holotype: male, no. A1526, Japan, Honshu, Ibaraki Pref., Kitaibaraki City, Sadanami, Ogawa Research Forest, in mature, mixed deciduous forest dominated by beech (*Fagus crenata*), 600 m, 11 May-1 June 1999, by Malaise trap, leg. Jaschhof [in KUEC]. Paratype: 1 male, no. A1527, same data as holotype [in ZIMG].

Discussion. While *Peromyia angulata* can be readily identified by its male genitalia with conspicuous tegmen, its other characters are rather indifferent seen taxonomically. I cannot classify it in any of the existing species groups.

Distribution and biology. Hn (Ib).

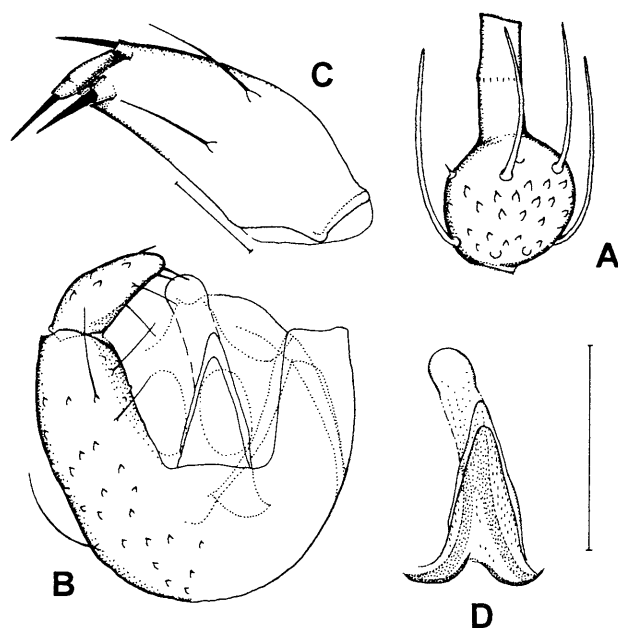
For details of habitat and flight period, see under types.

Etymology. The name is a Latin adjective meaning "angular" and refers to the male genitalia in this species having its tegmen of unusually angular shape.

***Peromyia ayaensis* sp. n.**
(Figs. 56A-D)

Male. Body size: 0.7 mm.

Head: Postfrons setose. Eye bridge 2-3 facets long laterally and 1-2 facets at vertex. With 1 row of postocular bristles. Antennae with 12 flagellomeres; terminal flagellomere constricted and with small additional node. Flagellomere 4 (Fig. 56A) with neck as long as node; node with double to triple whorl of short setae basally, among these with long



Figs. 56A-D: *Peromyia ayaensis* sp. n., male; A: flagellomere 4, ventrolateral view (0.05 mm); B: genitalia, ventral view (0.05 mm); C: gonostylus, dorsal view (0.01 mm); D: tegmen, ventral view (0.05 mm). A-D: holotype. (In parentheses: length of scale bar.)

sensory hairs, medially with double to triple whorl of long setae, distally with single long sensory hairs and a few sensory spines. Palpi short, 3-segmented.

Thorax: Scutum with lateral and dorsocentral rows of setae. Empodia just as long as claws. Claws slender, without teeth. Wings: R1 = 1.5 rs, strong anterior portion of C ending at point of intersection with R5, CuA2 very short.

Abdomen: Pattern of tergal plaques uncertain.

Genitalia: Gonocoxites (Fig. 56B) covered with setae and scales ventrally except its central portion, its distal margin with deep, roughly U-shaped emargination extending beyond midlength of gonocoxites. Gonostyli (Figs. 56B, C) slender, elongate, slightly curved inwards, evenly tapering to tip, sparsely covered with setae and scales, with 3 strong spines with 2 of them inserted almost apically and 1 subapically. Tegmen (Fig. 56D) membranous, elongate, extending beyond distal margin of gonocoxites, with triangular ventral plate and pubescent lobe of same shape covering 2/3 of tegmen length. Tergite 9 very short and weak, forming a sclerotized semicircle with medial interruption of sclerotization, with very short, interrupted row of short setae along distal margin. Tergite 10 bilobed, densely pubescent and with a few short setae. Sternite 10 weak, bilobed, densely pubescent.

Female. Unknown.

Types. Holotype: male, no. A0979, Japan, Kyushu, Miyazaki Pref., Aya Town, Aya Research Forest, in mature evergreen broad-leaved forest, 400-600 m, 5-20 Oct. 1999, by Malaise trap, leg. Jaschhof [in KUEC].

Discussion. *Peromyia ayaensis* is distinct by its male genitalia with the gonostyli having three strong spines apically / subapically and the tegmen with triangular pubescent lobe. Spine-bearing gonostyli are exceptional within the genus *Peromyia* and have been known only of two species in the *aurantiaca*-group. Further, flagellomeres in *ayaensis* are

remarkable in that their sensory hairs are sparse and not clearly arranged in whorls. This might be explained by the minute body size in this species. The systematic position of *ayaensis* remains unclarified.

Distribution and biology. Ku (Mz).

For details of habitat and flight period, see under types.

Etymology. The name refers to the type locality, Aya, where the single specimen originates from.

***Peromyia valens* sp. n.**

(Figs. 57A-C)

Male. Body size: 0.7-0.8 mm.

Head: Postfrons setose. Eye bridge 1-2 facets long laterally and 2-3 facets at vertex. With 2 rows of postocular bristles. Antennae with 12 flagellomeres; terminal flagellomere constricted and with small additional node. Flagellomere 4 (Fig. 57A) with neck as long or slightly longer than node; node with single to double whorl of short setae and scales basally, among those with fairly long sensory hairs, medially with single to double whorl of long setae, distally with whorl of long sensory hairs and a few sensory spines. Palpi 3-segmented.

Thorax: Scutum with lateral and dorsocentral rows of setae. Empodia as long as claws. Claws without teeth. Wings: R1 = 2.5-3 rs, strong anterior portion of C ending at point of intersection with R5 or extending for once the vein width of R5.

Abdomen/pattern of tergal plaques: 0 / 2 / 2 / 2 / 1 / 1 / 0 / 0.

Genitalia: Heavy in relation to body size. Gonocoxites (Fig. 57B) very long, covered with setae and scales ventrally, its distal margin with shallow emargination. Gonostyli (Fig. 57B) slender, elongate, evenly tapering to tip, sparsely covered with setae. Tegmen (Fig. 57C) huge, extending beyond both proximal and distal margins of gonocoxites, widest in distal half (when pressed by coverglass even wider as illustrated), with long ventral plate that is distinct by its proximal margin in proximal half of tegmen. Tergite 9 forming a sclerotized semicircle with medial interruption of sclerotization, with interrupted row of short setae along distal margin. Tergite 10 large, bilobed, extending a little beyond the distal margin of tergite 9, densely pubescent and with a few short setae. Sternite 10 weak, bilobed, densely pubescent.

Female. Unknown.

Types. Holotype: male, no. A0610, Japan, Honshu, Aomori Pref., Towadako Town, Tsuta hot spring, in mature, mixed deciduous forest dominated by beech (*Fagus crenata*), 500-600 m, 25 June-28 July 1999, by Malaise trap, leg. Jaschhof [in KUEC]. Paratypes: 10 males, no. A0611-A0620, same data as holotype [no. A0619-A0620 in KUEC, the others in ZIMG].

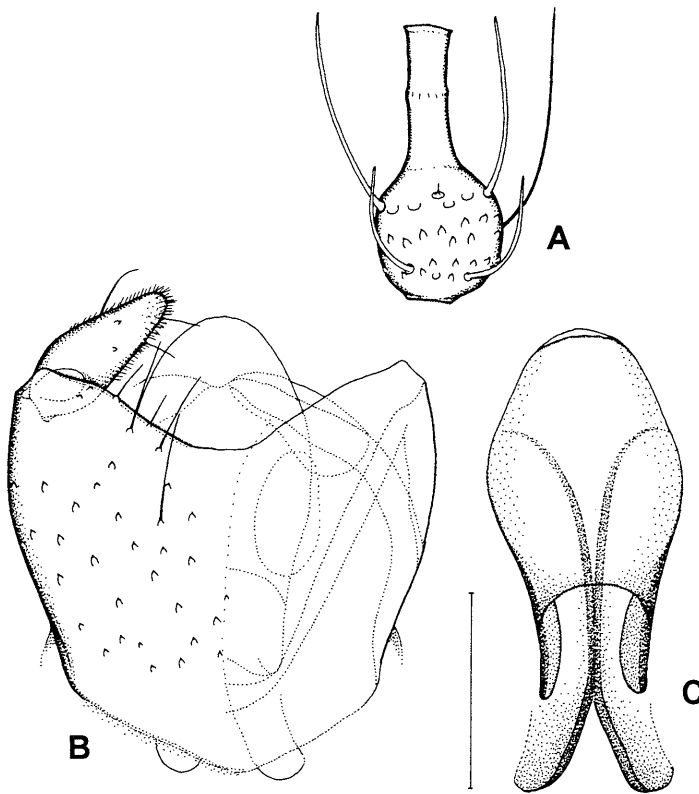
Discussion. *Peromyia valens* is readily distinguished from congeners by its male genitalia with heavy gonocoxites and huge tegmen. For the time being, I am not able to classify with confidence *valens* into any of the known species groups.

Distribution and biology. Hk (Ir), Hn (Ao, Ak, Ib).

The majority of specimens was captured in mature, deciduous forests dominated by beech (*Fagus crenata*). A few additional specimens originate from other mixed deciduous forests. Forests containing *valens* were located in 500-700 m a. s. l., on Hokkaido in 300 m. Flight period: Hk: VII; Hn: VI-VIII.

Etymology. The name is Latin meaning "strong" and refers to the extreme size of tegmen in this species.

Other material studied (16 males). Hk: Ir, Chitose City, 5 km E Lake Shikotsuko, 26 July 1999, leg. Jaschhof, 1 male, no. A0634; Hn: same data as holotype, 13 males, no. A0621-A0631, A0977-A0978; Ak, Minehama Vill., Shirakami Mts., Mizusawa River



Figs. 57A-C: *Peromyia valens* sp. n., male; A: flagellomere 4, lateral view; B: genitalia, ventral view; C: tegmen, ventral view. A-C: holotype. (Length of scale bar: 0.05 mm.)

Valley, 22 June 1999, leg. Jaschhof, 1 male, no. A0632; Ib, Kitaibaraki City, Sadanami, Ogawa Forest, 6-20 Aug. 1996, leg. Maeto, 1 male, no. A0633.

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References

- Berest, Z. L., 1995. Gall midges of the tribe Peromyini (Diptera, Cecidomyiidae). Communication 3. Notes on ecology and zoogeography. *Vestn. Zool.*, **2-3**: 29-33. (In Russian.)
- Jaschhof, M., 1996a. *Peromyia truncata* Yukawa, 1967 und das Problem des artifiziellen Polymorphismus (Diptera, Cecidomyiidae, Lestremiinae). *Stud. dipt.*, **3**(2): 329-337.
- Jaschhof, M., 1996b. Zur Gallmücken-Fauna Lapplands mit Beschreibung neuer Arten aus den Gattungen *Aprionus*, *Neurolyga* und *Peromyia* (Cecidomyiidae, Lestremiinae). *Stud. dipt.*, **3**(2): 338-355.

- Jaschhof, M., 1997. Neue paläarktische Gallmücken-Arten aus der Gattung *Peromyia* (Diptera: Cecidomyiidae: Lestremiinae). *Dtsch. ent. Z.*, **44**: 33-63.
- Jaschhof, M., 1998. Revision of the "Lestremiinae" (Diptera, Cecidomyiidae) of the Holarctic Region. *Stud. dipt., Suppl.*, **4**: 552 pp. (In German with English summary.)
- Jaschhof, M., 2000. On the Lestremiinae (Diptera: Cecidomyiidae) of Japan. General Introduction and Part 1: Genus *Pseudoperomyia* Jaschhof & Hippa, 1999. *Esakia*, (40): 11-35.
- Mamaev, B. M., 1990. Gall midges (Diptera, Cecidomyiidae) from the Subarctic. pp. 141-146. In *News in Systematics and Faunistics*. Naukova dumka, Kiev. (In Russian with English summary.)
- Mamaev, B. M., 1998a. New species of gall midges of subfamily Lestremiinae (Diptera, Cecidomyiidae). *All-Russian Institute of Continuous Education in Forestry, Pushkino*, **10**: 1-10. (In Russian.)
- Mamaev, B. M., 1998b. Natural system and species composition of gall midges belonging to subfamily Lestremiinae (Diptera, Cecidomyiidae). *All-Russian Institute of Continuous Education in Forestry, Pushkino*, **11**: 1-6.
- Mamaev, B. M., 1998c. New species of gall midges of various taxonomic groups (Diptera, Cecidomyiidae). *All-Russian Institute of Continuous Education in Forestry, Pushkino*, **13**: 1-10. (In Russian.)
- Mamaev, B. M. 1998d. Review of publication "Revision of the "Lestremiinae" (Diptera, Cecidomyiidae) of Holarctic Region" (by M. Jaschhof). *All-Russian Institute of Continuous Education in Forestry, Pushkino*, **14**: 1-7. (In Russian with English summary.)
- Mamaev, B. M. & Berest, Z. L., 1990. New species of lestremiine gall midges (Diptera, Cecidomyiidae) of the Carpathians and Transcarpathians. *Vestn. zool.*, **1990**(5): 18-24. (In Russian.)
- Mamaev, B.M. & Zaitzev, A., 1997a. Records of free-developing gall midges in Italy, with the description of four new species (Diptera, Cecidomyiidae). *Entomologica*, **31**: 125-132.
- Mamaev, B. M. & Zaitzev, A., 1997b. Four new aberrant species of gall midges of the genus *Peromyia* Kieffer (Diptera, Cecidomyiidae). *All-Russian Institute of Continuous Education in Forestry, Pushkino*, **7**: 1-9.
- Mamaev, B. M. & Zaitzev, A. 1999. 22. Family Cecidomyiidae - Gall Midges. pp. 240-271. In Ler, P.A. (ed.) *Key to the Insects of Russian Far East. Vol. 6. Diptera and Siphonaptera. Part 1*. Dal nauka, Vladivostok. (In Russian.)
- Yukawa, J., 1971. A revision of the Japanese gall midges (Diptera: Cecidomyiidae). *Mem. Fac. Agric. Kagoshima Univ.*, **8**: 203 pp.

